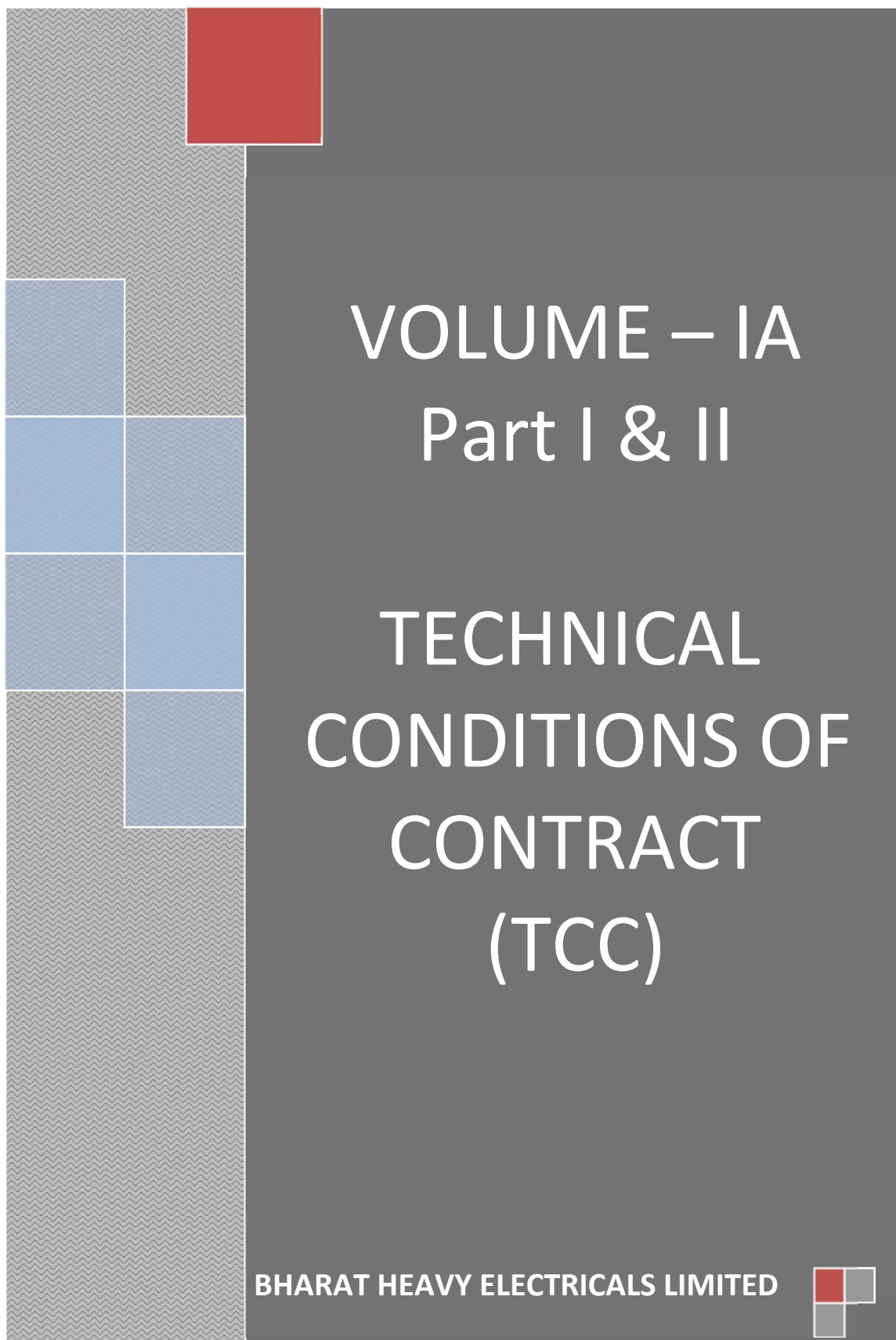




BHARAT HEAVY ELECTRICALS LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC)

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VOLUME - IA PART – I CHAPTER – I PROJECT INFORMATION

KOTHAGUDEM TPS UNIT 12 [1 x 800 MW] is being set up by TELANGANA STATE GENERATION CORPORATION at a site in Paloncha Village near Kothagudem district, Telangana, India. The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

1	Name of the Project	KOTHAGUDEM THERMAL POWER STATION STAGE-VII, UNIT#12
2	Station Capacity	1X800 MW (Coal Based)
3	Owner	Telangana State Power Generation Corporation Limited (TSGENCO)
4	Site Location	The mentioned plant has been installed adjacent to the existing D colony of Kothagudem thermal power station at Kothagudem.
5	Latitude	17° 37' N
6	Longitude	80° 42' E
7	Nearest Town	Kothagudem
8	Nearest Railway Station	Bhadrachalam Road (Known as Kothagudem)
9	Nearest Airport	180 Kms (Vijayawada)
10	Site Conditions	
A	Daily Minimum (Average)	12.9 Deg C
B	Daily Maximum (Average)	44.9 Deg C
C	Design Ambient Temperature	50 Deg C
D	Ambient Temperature (for Efficiency Guarantee)	38 Deg C
E	Relative Humidity for design / efficiency	35-82%
F	Plant Elevation above MSL	89 m above MSL
G	Mean Wind Speed	5.8 km/h
H	Wind Pressure	As per the latest revision of IS 875/1987
I	Earthquake Zone	Zone-III as per IS- 1893 (Part-IV)

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VOLUME- IA PART – I CHAPTER – II

SCOPE OF WORKS

PACKAGE: FLUE GAS DESULPHURISATION SYSTEM (FGD) AT UNIT-12,1X 800 MW, KOTHAGUDEM TPS

THE SCOPE OF THE WORK WILL COMPRISE OF BUT NOT LIMITED TO THE FOLLOWING:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

The Work to be carried out under the scope of these specifications is broadly as under: -

- (A) Material Handling, verification, stacking, re-shifting of materials, Tracking location of materials along with associated documentation in the computerized MM / SCMS package with BHEL and manual registers & preservation of materials / components of Flue Gas Desulphurization System (FGD), components of Steel Supplies like TMT Bars, Plate materials / structural steel / reinforcement steel / Tools and Plants, BHEL office furniture, miscellaneous items, etc.,
- (B) Erection, testing, commissioning, trial run and handing over of the FGD system (Mechanical) as per the tender specifications. This FGD system consists of mainly E & C of Ducts (Tap off from Existing Flue gas duct, Duct from Absorber to Chimney inlet & Duct inside chimney till flue can connection), Absorber tower along with oxidation blowers, Gas Gas Heater (GGH), Booster fans, Lime stone grinding and slurry preparation system consist of Wet ball mills, Lime stone silos, Slurry pumps, Gypsum dewatering system, Various Tanks and associated piping and also other auxiliaries i.e. Fire protection system, Equipment cooling water system (ACW and ECW pumps), fabrication and erection of Tanks of various sizes, removal& application of insulation, etc.& Painting of the FGD equipment at Kothagudem FGD 1X 800 MW.
- (C) Erection, alignment, welding, supply and application of painting of the prefabricated structural works at TP -9 at 1x800MW TPS, Kothagudem which include transportation of the fabricated structures from the fabrication yard to the site of erection. The detailed BOQ of prefabricated structures is indicated in the Chapter-IX. The quantity is indicative, however the contractor has to complete the balance works in TP-9 in all respect as per the drawings/BHEL Engineer Instruction and handover, within the quoted rates.
- (D) Attending the faults, rectification, breakdown / planned maintenance for 11KV construction power supply by deploying one C-Grade Licensed Supervisor along with qualified electricians round the clock.

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The work to be carried out at quoted / accepted rates by the Contractor under the scope of these specifications covers the complete work of receipt, unloading and handling of materials from Trucks/ Trailers etc. to project stores sheds / storage yards, loading and transporting from Stores/storage yards to site of erection or pre-assembly yard, fabrication and erection of Tanks of various sizes etc. and unloading at fabrication yard, pre-assembly area/erection site, checking, cleaning, chipping and leveling of foundations, providing packers and shims/pre-assembling of equipment at the pre-assembly yard, inspection, minor rectification, preservation, erection, leveling, and other adjustments, cutting, edge / surface preparation, welding, grinding, radiography, LPI/ MPI/ UT testing wherever needed, heat treatment, carrying out Commissioning tests as specified by BHEL including inter connection of all the termination points, erection and dismantling of all temporary piping, valves, pumps, tanks etc., required for the above operations, all pre-commissioning tests and trial runs of the Absorber Tower and Associated Systems, GGH, & other Misc. items and supply and application of Painting of the FGD system wherever applicable as per the Tender Conditions of the Contract.

1.2 Scope of Works with respect to Material Handling (A) is as follows: -

- 1.2.1. The number of storage yard may be one or more. All the yards shall be divided into many locations and shall be marked visibly (Grid marking).
- 1.2.2. Each location shall be identified by a display board which shall be visible from distant locations. All the materials and consumables required for this shall also be in the scope of the contractor. The contractor shall submit the yard layout with grid positions marked drawing to BHEL Engineer prior to commencement of first unloading.
- 1.2.3. It would be the responsibility of the contractor to keep in contact with the BHEL authorities at site to find out the arrival of the consignments. The lorry way bill/ truck way bill for the consignments would be handed over to the contractor immediately on receipt.
- 1.2.4. The contractor shall examine the packages, consignments etc., on arrival and bring to the notice of Transport authorities and BHEL authorities regarding loss/ damages, if any observed in the consignments proposed to be taken delivery of, before, taking delivery, particularly of consignment in —small the weight of the packages and any discrepancies shall be reported immediately to BHEL/ Transport authorities. In case it becomes necessary to take open delivery from the authorities, contractor should make all arrangements for taking open deliveries. All expenses connected there with shall be to the account of the contractor. Any loss that occurs to BHEL on account this will be recovered from his progress bills.
- 1.2.5. Deployment of Manpower for day to day working at stores and updating of the data in SMCS or any system deemed fit and followed at site for maintaining the records of the materials.

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Details of manpower to be deployed: -

- a) Computer Operator- 1 nos
- b) Clerical Staff- 1 nos
- c) Supervisor- 1 nos
- d) Helper- 1 nos

- 1.2.6. Contractor shall examine all the shipment and notify BHEL Engineer immediately for the purpose of engineer's information. The contractor shall submit a report every week detailing in this regard.
- 1.2.7. In case of apparent damages / shortage to consignment / packing noticed by the contractor such cases shall be brought to the notice of BHEL and cleared only with BHEL's knowledge / approval.
- 1.2.8. Any discrepancy / shortage / damage found in the consignment after taking delivery from the carriers after giving clear receipt would be the responsibility of the contractor and the amount liable to be lost by BHEL on such amount is recoverable from the contractor.
- 1.2.9. Also, reporting the incidents of thefts if any to police and supporting BHEL to get the documents like FIR required to raise Insurance Claim, if the theft happens while the material is in BHEL Stores/ Storage Yard.
- 1.2.10. The contractor is required to find out from concerned authorities, regarding arrival of consignment prior to the receipt of consignment note, if any, and take delivery of the same on "Indemnity Bond". Indemnity Bonds would be executed by BHEL, when intimation regarding arrival of consignment is furnished by the contractor.
- 1.2.11. Detailed verification of materials with reference to packing list / Loading advise slip / etc., after unpacking of boxes & crates; repacking where called for, after detailed verification; preparation of receipt inspection reports etc. shall be carried out within the quoted rate within 30 days of the unloading. If the verification is not carried out within 30 days for reasons attributable to the contractor, then BHEL is having right to carry out the verification at the risk and cost of the contractor.
- 1.2.12. Consignment coming on Sundays and Holidays are also required to be handled by the contractor on the same day. Since the offices and go downs will probably remain closed on these days, it will be the responsibility of the contractor to contact the Site Engineer /his authorized representative at BHEL at their residence and obtain instructions.
- 1.2.13. Since the consignment are expected to arrive during any time of the day or night contractor shall have his workmen round-the-clock at site as well as other places as required to unload the materials. Contractor's quoted rate shall include all such contingencies.
- 1.2.14. Unloading of materials / components at the storage yard, using contractor's own Lorries, Trailers and other equipment with valid road permits for their operation, unloading and

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stacking handling at storage yard for verification shall be the responsibility of the contractor under this contract.

1.2.15. Unloading from Transport equipment's, transportation, unloading at storage area / work site of heavy sophisticated equipment like heavy motors, modules, heavy bearings, fans, Transformers, Electricals Panels, components of FGD, etc., shall be done in the presence of and as per the direction of BHEL representative including stacking and restacking if necessary.

1.2.16. All the materials shall be stored at minimum of 6" height above the ground level by the use of concrete or wooden sleepers or wooden logs. No material shall be allowed to remain on ground at any time. Materials shall not be stacked in low lying areas, where it is likely to get flooded during rain.

FOR STACKING THE MATERIALS ABOVE THE GROUND LEVEL, WOODEN / CONCRETE SLEEPERS, WOODEN LOGS, CONCRETE BLOCKS AND FIRE RESISTANT COVERING MATERIAL (TARPAULINS) ETC, WHEREVER DEEMED NECESSARY, WILL BE ARRANGED BY BHEL FREE OF COST AS DECIDED BY BHEL ENGINEER. However, for unloading the materials, wooden sleepers shall be provided by the contractor.

1.2.17. Stacking of the materials shall be done as per the instructions and to the satisfaction of BHEL Engineers. The materials shall be stacked so that it should facilitate easy handling during erection and also enable traceability and "ready to lift" position in the stacked area for civil / mechanical / electrical/ other contractors. In case any negligence or improper stacking is noticed, it shall be the responsibility of the contractor to re-stack at his cost. Failure to do so may force BHEL to get the job done through other agencies and recover the same from the contractor.

1.2.18. Under the scope of this contract, it shall be the responsibility of the contractor to provide facilities to open the package in the presence of BHEL Engineers verifying the same, repacking wherever and whenever necessary properly stacking them as may be directed by BHEL so as to facilitate proper handling and verification.

1.2.19. The contractor shall execute the work in the most substantial and workmen like manner. The stores shall be handled with care and diligence. Any loss to BHEL due to contractor's lapse shall have to be made good by the contractor.

1.2.20. General cleaning, grass cutting and upkeep of storage yard, stores area shall be carried out within the quoted rates for unloading, verification, identification and storage. The grass cutting shall be done once in 3 months on an average.

1.2.21. As per instruction of BHEL Engineer, on receipt of "Stores Issue Voucher" the contractor shall locate, identify the material and shall keep it in ready to lift position immediately

1.2.22. The contractor, with his manpower shall update and maintain the documents and records of BHEL 's Material Management department as per the instruction of the BHEL

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engineer. Entering the data in the BHEL computer as per the instruction of the BHEL engineer is also in the scope of the contractor.

- 1.2.23. Handling and loading of outgoing materials those are to be sent to other destinations shall be carried out by the contractor. Similarly, in case of any requirement, the shifting of the stacked materials to a new location also shall be carried out by the contractor. "Loading of outgoing materials (or) Shifting of the stacked materials" shall be paid to the contractor at the item rate quoted for handling.
- 1.2.24. In case of delay in unloading / fail to unload the equipment immediately, BHEL reserve the right to unload the equipment's / components through other agencies at the risk and cost of the contractor.
- 1.2.25. The owner / employer or his authorized agents may inspect stores, storage yard, etc. during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.
- 1.2.26. The contractor will arrange for gate passes and any other permits required for carrying out his work from the respective agencies at his own cost. He will also comply with regulations of the customer within the project area, any of the State Government and other Government agencies.
- 1.2.27. Materials shall be stacked neatly, preserved and stored in the stores in an orderly manner.
- 1.2.28. From the area / delivery points of all materials / components pertaining to generating units, auxiliaries, piping, miscellaneous plants and equipments, panels, cables and other electrical equipments, oil drums, tools, plants or any other items and equipments meant for erection, commissioning, and office equipment / furniture and miscellaneous items, contractor to use his own cranes, tractor / trailers, trucks, lorries, slings, jacks, lifting tackles and any other equipments for this job. Handling of equipments for verification of components including opening of cases / crates / boxes and repacking / stacking after verification shall also be the responsibility of the contractor.
- 1.2.29. Compliance with statutory obligations as well as any other requirements / provisions with respect to contractor 's manpower, equipment including insurance, medical facilities, minimum wages, safety requirements, accommodations etc., to be the responsibility of the contractor.
- 1.2.30. The contractor shall provide the necessary resources like trained PC operators, clerical / secretarial staff / helpers for maintaining the Computerized Material Management Package provided by BHEL and carry out all operations of maintenance of documentation (soft as well as hard copies) including housekeeping for the works covered under this tender. The computer terminals for this purpose will be provided by

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BHEL. 1no. computer with latest configuration may be provided by the Contractor for stores data entry.

1.2.31. For material preservation at BHEL Storage Yard before issue for erection, all the preservative consumables like paint, grease etc. contractor has to arrange for application of preservatives with their own T&P, consumables like brush, emery sheet, manpower etc. including paint within the quoted rates

1.2.32. RESHIFTING AND RESTACKING OF MATERIALS / COMPONENTS:

1.2.32.1. Resifting and restacking of the materials / components shall be carried out by the contractor as per the instruction of BHEL engineer without any delay.

1.2.32.2. In case it is necessary to shift and re-stack the materials kept at work area/ site to enable other agencies to carry out their work, same shall be done by the contractor and shall be considered as Re shifting and restacking of materials / components.

1.2.33. ONLINE SITE CONSTRUCTION MANAGEMENT SYSTEM (SCMS):

If applicable for the project, Contractor has to update the BHEL's online material management system, reporting of daily progress, billing and other similar activities, within the quoted rate.

1.2.34. EXCLUSIONS:

1.2.34.1. Unloading of materials received through rail in RAKES.

1.2.34.2. Supply of preservation materials like paints, grease etc.

Note: FOR FURTHER DETAILED SCOPE OF WORKS, REFER RELEVANT CHAPTERS IN THIS BOOK

1.3 Scope of Works with respect to FGD Erection and Commissioning (B) is as follows: -

The scope of work under these specifications for Erection, testing, commissioning, trial Operation, and fabrication and erection of Tanks of various sizes, etc., Painting & handing over of FGD system(Mechanical) and Other Related Mechanical Auxiliaries for 1X800 MW Kothagudem TPS FGD. Scope of work broadly consists of but not limited to following:

1.3.1 Handling of materials at BHEL/Client stores/storage yard and transportation to site of erection, Testing & Assistance for commissioning and Trial Operation including supply and application of final painting of FGD system (Mechanical), Fire protection and ECW system etc.

1.3.2 Tapping off Duct from existing Flue Gas Duct up to Booster Fan Inlet Gate with related supports for one unit and erection of Flue Gas by pass Damper.

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Scope Involves Following: -

- 1.3.2.1. Making Suitable scaffolding arrangements to reach out at the duct location for Safely removal of insulation, cutting and removal of duct portion.
- 1.3.2.2. Removal of Insulation (Cladding sheet & Insulation wool) at different locations for the Unit to facilitate for cutting & removal of existing duct for erection of bypass damper & tap off ducts.
- 1.3.2.3. Cutting and removal of portion of existing duct.
- 1.3.2.4. Pre-Assembly of steel bed for assembly of bypass damper different modules as per the drawing.
- 1.3.2.5. Erection, alignment, welding and NDT of Duct/damper, supporting structure of the damper along with approach platforms as per the drawings are included in the scope of the works.
- 1.3.2.6. Any additional works if required to be done for the erection of the By-pass dampers shall be done by vendor, no additional payments shall be made for the same.
- 1.3.3 The work to be carried out at quoted / accepted rates by the Contractor under the scope of these specifications covers the checking, cleaning chipping and leveling of foundations, providing packers and shims/pre-assembling of equipment at the preassembly yard, inspection, minor rectification, preservation, erection, leveling, and other adjustments, cutting, edge / surface preparation, welding, grinding, radiography, LPI/ MPI/ UT testing wherever needed, heat treatment, carrying out air tightness test by soap solution / kerosene, hydraulic test, including supply and application of final painting.
- 1.3.4 The quantities indicated in the tender specification are approximate and are liable for variation and alteration at the discretion of BHEL. The quoted unit rate shall be applicable for any additional product group also, if included at a later date integral to the main scope of work / package envisaged. The work executed shall be measured and priced as per the unit rate arrived at for each work area as mentioned in the relevant clauses.
- 1.3.5 The PG wise breakup of FGD and Auxiliaries etc. are indicated in the relevant chapters of this tender specification, but the contractor is required to erect actual tonnage which may be necessary to complete the work in all respects as detailed in the tender specifications, for which payments shall be released on finally settled rates. The weights and dimensions of material shown are approximate and are liable to vary. No increase in quoted / accepted rates / prices shall be allowed due to change in weights and dimensions of the equipment / materials.

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- 1.3.6 The weights given in the Chapter-IX are approximate and these are subject to change as per site conditions.
- 1.3.7 During the course of execution of work, certain rework / modification / rectification /repairs / fabrication etc. will be necessary on account of feedback from various relevant sources, and also on account of design discrepancies/ alterations, manufacturing defects, site operations/ maintenance requirements. Contractor shall carry out such rework / modification / rectification / fabrication / repairs etc. promptly and expeditiously. Daily log sheets indicating the details of work carried out, man-hours etc. shall be maintained by the contractor and got signed by BHEL engineer every day. Claims of contractor, if any, for such works will be dealt as per conditions of contract and payments will be released as per the agreed rates.
- 1.3.8 Supervisors/ Engineers, consumables etc., required for the scope of work shall be provided by the contractor. All the expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor's quoted rates should be inclusive of all such contingencies.
- 1.3.9 It shall be specially noted that the contractor's labour and staff may have to work round the clock to meet the completion schedules / plans, which may involve payment of considerable overtime. The contractor's quoted rates should be inclusive of all such contingencies.
- 1.3.10 The terminal points can be inferred from the relevant drawings and any further clarifications can be obtained / decided by BHEL and that is final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals. Carrying out work as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per BHEL Engineers instruction is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate.
- 1.3.11 The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies / departmentally

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and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.

- 1.3.12 The work covered under this specification is of highly sophisticated nature requiring the best quality of workmanship, engineering and construction management. The contractor should ensure timely completion of the work. The contractor must have the adequate quantity of tools, construction aids, equipments, etc., in his possession. He must also on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel.
- 1.3.13 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The erection manuals or guidelines for FGD system, which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any failure to comply with the above might lead to rework and the cost for the same shall be borne by the contractor only. BHEL engineer, depending upon the availability of materials, fronts etc. will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs or for any reason whatsoever.
- 1.3.14 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a particular given time. Activities and erection program have to be planned in such a way that the milestone events are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.
- 1.3.15 No member of the already erected structure/ platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.
- 1.3.16 The storage yard can be located within the plant boundary or outside the plant boundary as per the space allocated by Customer. All materials have to be transported from storage yard to construction area by the contractor at his own cost.
- 1.3.17 Contractor should visit site and acquire full knowledge and information about site conditions. The bidder must visit site, to acquaint themselves with the conditions prevailing at site and in and around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid.

The FGD system shall be based on Wet Limestone Forced Oxidation process and unit shall be provided with an independent absorber. The scope of works is detailed below.

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- 1.3.18 Gas from terminal point on ID fan discharge duct shall be taken directly to the absorber through Booster Fans. In the absorber, SO₂ in flue gas shall be removed by a spray of recirculating slurry, pumped by slurry recirculation pumps.
- 1.3.19 Compressed oxidation air shall be blown through the slurry in the oxidation tank, to oxidize the Calcium sulphite to gypsum.
- 1.3.20 Clean gas from the absorber shall be taken to the Wet Chimney through three stage mist eliminators.
- 1.3.21 Limestone to the absorbers of the units shall be supplied by a wet limestone grinding system, common for the units. Limestone shall be fed to the Limestone day silos which in turn will feed the Limestone to wet ball mill through a gravimetric feeder.
- 1.3.22 The gypsum from the absorber(s) shall be pumped by dedicated gypsum bleed pumps to a common Gypsum Dewatering system consisting of two streams (2x100%) of primary and secondary hydro cyclone and vacuum belt filters for gypsum dewatering. The water removed from the absorber shall be recycled to the absorbers. The waste water from the system shall be collected and neutralized using lime and neutralized effluent shall be pumped at required pressure to waste water terminal point.
- 1.3.23 The brief list of the major equipment to be erected under the FGD system but not limited to following:
- A. Absorber System along with supporting structures
 - B. Booster Fans & isolation gates
 - C. Tanks of various sizes
 - D. Lime stone grinding and slurry preparation system consist of lime stone silos, bunker, gravimetric feeder, wet ball mills, hydro cyclones
 - E. Slurry pumps (Absorber Slurry recirculation pumps, Gypsum Bleed pumps, limestone Slurry feed pumps)
 - F. Gypsum Dewatering system consists of Vacuum belt filter, hydro cyclones
 - G. Process water and cooling water storage system
 - H. Thermal Insulation and cladding sheets
 - I. Sump Pumps
 - J. Piping system

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- K. Equipment Cooling Water System (PHEs, DMCW pumps)
- L. Miscellaneous platforms, galleries, handrails
- M. Fire Protection System including hydrant, MVWS, HVWS
- N. Equipment Handling System
- O. Ducting System including Gates & Dampers

Tentative weight to be erected for the FGD System shall be 6655 MT

1.3.24 FLUE GAS & ABSORPTION SYSTEM-

Flue Gas from the Boiler is tapped off at the ID Fan outlet common discharge duct to Chimney. The total gas pressure loss in the FGD plant is compensated by Booster Fans. Bypass Damper is provided to permit isolation of FGD plant or flexible operation of Boiler and FGD plant.

1.3.25 BOOSTER FAN

The FGD Booster Fan shall be single stage axial reaction type with Actuator with linkage for blade pitch control. The Fan shall be provided with Rotor assembly, Static parts, Anti-friction Bearings, Pedestal for fan bearings, coupling between Fans & Motor and Forced oil lubricating system.

1.3.25.1. There will be 2 numbers of Booster Fan for FGD system along with drive Motor and relevant accessories.

1.3.25.2. The duct from Booster Fan outlet upto GGH inlet shall be of carbon steel.

1.3.25.3. The duct from GGH outlet to Absorber inlet shall be of Carbon steel with adequate thickness of The Glass Flake Lining.

1.3.25.4. The duct from Absorber outlet to GGH inlet shall be of Carbon steel with adequate thickness of Glass Flake Lining.

1.3.25.5. The duct from GGH outlet to Common discharge duct to Chimney shall be Carbon steel with adequate thickness of Glass Flake Lining.

1.3.25.6. The application of the Glass Flake Lining is excluded from the scope of the Bidder, however the necessary assistance for the application of the lining is included in scope.

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1.3.25.7. Thermal insulation of lightly Resin Bonded rock wool of density 100 kg/m³ for duct work along with Aluminium Cladding materials.

1.3.26 GATES AND DAMPERS

The following Gates & Bi-plane dampers along with applicable actuators as mentioned below will be provided for the boilers.

SL No	Location	Type	Actuator	Qty
1.0	FGD Inlet Gate	Guillotine	Electrical	2
2.0	Booster Fan Outlet Gate	Guillotine	Electrical	2
3.0	FGD bypass Damper	Biplane Damper	Pneumatic	2
4.0	FGD Outlet Gate	Guillotine	Electrical	2

1.3.27 GAS-GAS GEATER (GGH)

1.3.27.1 One number of Rotary Regenerative type GGH will be provided along with associated accessories.

1.3.27.2 GGH shall be designed so that the flue gas temperature at GGH outlet to stack shall be > 85 deg C under guarantee point condition.

1.3.27.3 The GGH components shall be made up of corrosion resistant materials to withstand the acidic atmosphere encountered in FGD operation.

1.3.27.4 The treated flue gas from absorber enters the gas-gas heater to be reheated.

1.3.27.5 In GGH, there is an intrinsically pattern to form a sealing mechanism so that the untreated gas leakage to the treated gas side can be minimized.

1.3.27.6 Untreated gas is leaked into the treated gas side due to space contained by a rotor sector and two sector plates at the rotor turning.

1.3.27.7 To reduce fly ash and gas leakage of GGH, a scavenging Fan is installed.

1.3.27.8 Soot Blowing system is installed to wash fly ash on the heating elements. The heating elements are washed by steam periodically. Further to soot blowing system by steam, a GGH high pressure washing system and GGH low pressure washing system are installed.

1.3.27.9 The GGH high pressure washing system starts automatically if GGH differential pressure

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High-High is initiated. The low pressure washing is conducted during FGD plant is out of service if necessary.

1.3.27.10 The inside of the GGH is to be protected by a Glass Flake Lining Material. The application of the Glass Flake Lining is excluded from the scope of the Bidder, however the necessary assistance for the application of the lining is included in scope.

1.3.27.11 No hot work is permitted inside the Absorber Area including GGH and other auxiliaries after the completion of the Glass Flake Lining. Vendor must ensure that all the works are completed inside the absorber before releasing the same for the lining.

1.3.28 ABSORBER

1.3.28.1 One number of Absorber system complete with internals Spray Pipes, Spray Nozzles, Jet Air Sparger (JAS), Agitator and Mist eliminator will be provided.

1.3.28.2 The Absorber tower and oxidation Tank shall be made up of carbon steel with adequate thickness of Glass Flake lining to take care of corrosion.

1.3.28.3 The Glass Flake Lining of the Absorber is excluded from the scope of vendor, however the assistance for the lining shall be provided by vendor within the rates quoted.

1.3.28.4 No hot works are allowed inside the Absorber once the absorber is released for application of the Glass Flake Lining.

1.3.28.5 The Absorber wet-dry interface shall be made of Carbon steel material lined with alloy C 276.

1.3.28.6 There will be one level of slurry spray system designed to achieve a desired L/G ratio required to meet the guaranteed removal efficiency.

1.3.28.7 Absorber Recirculation Pumps (4 working +1 standby) to spray slurry inside the absorber and absorb SO₂.

1.3.28.8 The Absorber Recirculation Tank will be provided with two (2) numbers of side mounted Agitators for keeping the slurry under suspension during shut down and maintenance.

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- 1.3.28.9 Oxidation Air Blowers (2 working + 1 standby) for absorber will be provided for oxidation of Calcium sulphite to Calcium sulphate.
- 1.3.28.10 One number of Passengers cum Goods Elevator of capacity 1000 kgs shall be provided with adequate landings for absorber. The erection and commissioning of the Elevator is in Elevator Vendor Scope. Lift Structure and other supporting structure is included in the scope of this contract.
- 1.3.28.11 In case of abnormal situations due to electrical blackout, failure of absorber recirculation pumps etc. the absorber internals will be protected by emergency cooling system. One emergency cooling tank will be provided to meet the emergency requirement. Erection of the same is included in the scope of vendor. Required TnP required for the same are to be arranged by vendor.
- 1.3.28.12 A two Stage Mist Eliminator is located between the absorber and Stack. A washing Spray System is installed to intermittently wash down the mist eliminator element surfaces and thereby prevent any deposit build-up on them.
- 1.3.28.13 Complete ducting System from ID fan outlet duct to absorber tower and duct from absorber outlet to chimney.
- a) The Duct from FGD Tapping Point at by pass duct (ID Fan Common Discharge duct to Chimney) up to Booster Fan Inlet shall be of Carbon Steel of 6 mm thickness.
 - b) The Duct from Booster Fan outlet to GGH inlet shall be 6 mm thick Carbon Steel.
 - c) The Duct from GGH outlet to Absorber inlet shall be of 7 mm thick Carbon steel with 1.20 mm thickness of Glass Flake lining.
 - d) The Duct from Absorber outlet to GGH inlet shall be of 6 mm thick Carbon steel with 1.20 mm thickness of Glass Flake lining.
 - e) The Duct from GGH outlet to bypass duct shall be of 6 mm thick Carbon steel with 1.2 mm thickness of Glass Flake lining.
 - f) Thermal insulation of Lightly resin bonded rock wool of density 100 kg/m³ for duct work along with aluminium cladding material.
- 1.3.28.14 Installation, erection and commissioning of the 3 nos of Electric Hoist including receipt at site, installation of Supporting and Main Structure of the Hoist, Erection and Commissioning of the Hoists at the locations identified in the drawing.

1.3.29 LIMESTONE GRINDING SYSTEM

1.3.29.1. Ball Mill System

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- 1.3.29.1.1 Limestone of <250mm size is stored in Unloading hoppers and crushed in Limestone handling area. Crushed Limestone of size (<20mm) is conveyed to the inlet of Limestone storage day silo.
- 1.3.29.1.2 There will be 2 numbers (2x100 %) of Limestone storage day silo for storage capacity of 8 hours Limestone stone requirement. Fabrication and erection of the 2 nos of Limestone Storage Silos complete with Supporting Steel structure, platforms, Staircase, air canons, power operated gates, gravimeter feeders etc. The Limestone storage day silo is made up of carbon steel of adequate thickness and the hopper cones will be provided with 4 mm of SS lining.
- 1.3.29.1.3 One number of Gravimetric feeders will be provided under each hopper.
- 1.3.29.1.4 One number of Bunker outlet chute with motorized shut off gate will be provided for feeding Limestone to the feeder.
- 1.3.29.1.5 Two (2) numbers (2x100 %) Wet Ball Mill System along with complete accessories will be provided for grinding of Limestone.
- 1.3.29.1.6 Each Ball Mill shall be designed to meet maximum limestone requirement at Design point- BMCR Indian coal. Each mill shall be fed from an independent Limestone Bunker. Each mill shall be complete with the following items, as some minimum requirements: -
- a) A Bunker Outlet gate.
 - b) A gravimetric limestone feeder along with its drive and all other auxiliaries
 - c) One no. separator tank with agitator(s).
 - d) 2x100% Mill circuit pump.
 - e) One set of hydro-cyclone
 - f) A peripheral/central drive system with motor, speed reduced gearbox and other auxiliaries.
 - g) Complete lubricating system
 - h) Lube oil pumps, coolers, duplex oil filters, connecting piping
 - i) All connecting pipes/chutes along with necessary valve between various systems of the mills.
 - j) Limestone Grinding System.

1.3.30 LIMESTONE SLURRY STORAGE SYSTEM

- 1.3.30.1 One (1) number of Limestone Slurry tank each designed for a storage capacity of 8 hours' continuous limestone requirement.

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1.3.30.2 The slurry tank shall be made up of carbon steel of adequate thickness of glass flake lining.

1.3.30.3 The Slurry Tank will be provided with one number of centre mounted Agitator.

1.3.30.4 Two (2) numbers of Limestone slurry pumps (1 working + 1 standby) will be provided.

1.3.31 GYPSUM DEWATERING SYSTEM

1.3.31.1 There will be two stages of Gypsum dewatering system consisting primary stage of sets of hydro-cyclones and secondary stage of vacuum belt filters for dewatering of Gypsum.

1.3.31.2 2x100% Primary hydro cyclone consisting of Hydro Cyclone Clusters along with Anchor Bolts, Nuts and washers, flanges, accessory piping with skid will be provided. The underflow of Primary hydro cyclone is sent to vacuum belt filter. The hydro cyclone shall be made up of carbon steel with adequate rubber lining/lining material. The clusters of the Hydro cyclone will be made up of polyurethane.

1.3.31.3 The overflow of primary hydro cyclones will be fed to one number of Secondary Hydro cyclone feed tank.

1.3.31.4 There will be 2 numbers of vacuum Belt Filters (2x100 %) complete with Accessories including discharge chute, Drivers (VFD and LCP) and driving motors (IE3) with inverter panel, cloth spray nozzles, rubber belt etc. for Gypsum dewatering. Each vacuum belt filter shall be designed to meet maximum gypsum produced at Design point- BMCR Indian coal.

1.3.31.5 2x100% Secondary Hydro cyclone consisting of Hydro Cyclone Clusters along with Anchor Bolts, Nuts and washers, flanges, accessory piping with skid will feed the slurry from Secondary hydro cyclone feed tank to secondary hydro cyclones. The underflow is fed to the filtrate water tank. The overflow is fed to the waste water tank.

1.3.31.6 2 nos of Vent fan including enclosure and its arrangement and 2 nos of Vacuum receivers with anchor bolts, nuts and washer are included in the scope.

1.3.31.7 1 nos of Belt Filter Washing vertical tank of Size 3X3.5 (Dia X H) is supplied for the Gypsum Dewatering System.

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- 1.3.31.8 2 nos of Belt Filter Washing Pump with motor which is used for the cake wash and sealing of the vacuum pump is included in the scope of vendor.
- 1.3.31.9 All interconnecting piping (slurry, air and water pipes) which includes the requisite pipe support materials, fittings, gasket, flange materials, bolting along with valves for the entire Gypsum Dewatering System and the expansion Joints at the suction and discharge of each pump is included in the scope of vendor.
- 1.3.31.10 Neutralization tank is provided to control pH of waste water slurry before discharging to ash pond.
- 1.3.31.11 The Gypsum cake from the belt filter will be discharged from the first floor to Gypsum storage shed at Ground floor in Gypsum Dewatering building. Customer to stock gypsum in Gypsum storage shed using front end loaders. Gypsum storage shed of 3 days storage capacity will be provided.
- 1.3.31.12 The agency shall receive the material at site as per identified scope of supply, which includes unloading at site and storing and preserving it till the time it is handed over to customer.
- 1.3.31.13 Calibration of skid supplied instrumentation (PSVs, Gauges, and Transmitters etc.) is in the scope of Erection Agency.
- 1.3.31.14 Erection Agency has to ensure that proper storage and preservation requirements shall be followed as per OEM Recommendations & O&M Manuals of respective equipment, the project bid specifications and standard design practices.
- 1.3.31.15 Erection consumables such as welding electrodes, fillers etc. shall be in scope of Erection Agency.
- 1.3.31.16 Quantity of painting & Coating material for equipment / systems above shall be in the scope of Erection Agency as per project requirements. Quantity of wrapping & coating material for above equipment / systems are minimal in quantity and hence Erection Agency to take-up the supply of same accordingly.
- 1.3.31.17 E&C of Above GDW package shall be in Erection Agency Scope. This includes Storage, In-plant transportation, fabrication, erection, testing (as applicable), painting, commissioning, Handing Over is by Erection Agency.

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1.3.31.18 The complete GDW Package shall be supplied either in Semi Knocked Down/Completely Knocked down condition. Assembling them as per the instruction shall be done by the erection vendor as per the applicable drawings and as per the instructions of the BHEL engineer.

1.3.32 TANKS

1.3.32.1 The Following tanks (Slurry and Water) Fabrication, Erection, Commissioning and Final Hand over to end customer are included in the scope of the bidder.

SI No	Slurry Tanks (Mild Steel Tanks, Internally Lined with Protective Layer)	Dimensions (Each) Dia X Height in meters	Quantity	Weight (Each Tank) MT
1	Auxiliary Absorbent Tank	13.6 x 13.6	1	75
2	Lime Stone Slurry Storage Tank	11.2 x 11.2	2	75
3	Secondary Hydro Cyclone Feed Storage Tank	4.2 x 5.4	1	18
4	Waste Water Tank	5.8 x 7	1	32

SI No	Water Storage Tanks	Dimensions (Each) Dia X Height in meters	Quantity	Weight (Each Tank) MT
1	Process Water Tank	4.5 x 4.5	1	16

All the slurry tanks will be glass flake lined and drain sumps are made of RCC with epoxy painting.

1.3.32.2 Supply of Tank Materials (Plates, Structural, Name Plates, Nozzles, Flanges/Counter Flanges, Stud nuts, Foundation Bolts etc.) for all FGD Storage Tanks as listed above shall be by BHEL free of cost.

1.3.32.3 BHEL Will provide on the GA Drawings for the tanks, the fabrication drawings are to be submitted by vendor along with the cutting plan according to the plates supplied by BHEL. The allowable wastage shall be vetted by BHEL Engineer during the cutting plan approval. Scrap generated during the erection shall be returned back to BHEL.

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- 1.3.32.4 Brief list of system / sub system to be erected by the contractor & approximate weight are given elsewhere in this booklet are meant for giving general idea to the tenderer. The plates are sent in parts for convenient transportation / layout requirements. They are to be cleaned, pre- assembled in stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL engineers.
- 1.3.32.5 Receipt of materials / component to be erected by the contractor, loading and transportation from the storage yard to the project site, stacking, storage and preservation.
- 1.3.32.6 Fabrication and E&C of all the above storage tanks including Storage, In-Plant Transportation, Fabrication, erection, radiography testing as per IS Codes IS 803, Hydro Testing, Painting, Commissioning, Handing Over to end customer is included in the scope of bidder.
- 1.3.32.7 Painting including the Supply of Paint, and Application including Surface Preparation Internal and External as per the applicability of all the Storage Tanks. The Painting shall be done strictly as per the approved painting schedule/specifications as provided by BHEL/Customer.
- 1.3.32.8 The terminal points are given as per drawing /decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.
- 1.3.32.9 Surface preparation of all the tanks external and internal shall be carried out by the bidder.
- 1.3.32.10 Painting includes the external surface of all the slurry storage tanks and external and internal surfaces of process water storage tank.
- 1.3.32.11 Surface area of all the tanks is approx. 6,500 Sq Mts which is subjected to change to 15% on positive/negative side.
- 1.3.32.12 All the slurry pipes shall be of CSRL/ FRP material.
- 1.3.32.13 General scope of system covered under scope of work includes
- a) Cutting, edge preparation, rolling, erection, full welding, punch points clearance & testing of fixed roof storage tanks.
 - b) Fabrication and erection of structural supports for all Tanks as per approved

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drawings.

- c) Erection of Ready-made Gratings, Platforms & fabrication and erection of hand railing.
- d) Fabrication and erection of SS/MS pipe nozzles arrangement to the tank.
- e) Vacuum Box Test, Hydro testing, Pneumatic Testing etc. required for Tanks as per API-650/IS-803 to be carried out in accordance with the laid down procedure of tanks etc.
- f) Tanks Radiography is in the scope of Contractor.

1.3.33 AGITATORS, DOSING SYSTEM and MATERIAL HANDLING Equipments

1.3.33.1 The erection, testing and commissioning of the Agitators for the Tanks is included in the scope of vendor. List of actuators are attached and are indicative only.

SL No	Description	Quantity	Unit	Dimensions (each) L X B X H (M)/Dia	Weight (Each) Tons	Remarks
1	Auxiliary Absorbent Tank Agitator (1 nos Tank)	3 Agitators in 1 tank	Nos	2.0 m X 1.5 m (H)	1.5	1) Horizontal Type 2) Each Agitator has a gear box and drive motor 3) 3 nos Agitator per tank
2	Limestone Slurry Storage Tank Agitator	2	Nos	2.0 m X 10 m (H)	5	1) Vertical Type 2) Each Agitator has a gear box and drive motor
3	Secondary Hydro Cyclone Feed Tank Agitator	1	Nos	4.0 m X 5.0 m (H)	1.5	1) Vertical Type 2) Each Agitator has a gear box and drive motor.
4	FILTRATE Water Sump Agitator	1	Nos	3.6 m X 4.0 m (H)	1	1) Vertical Type 2) Each Agitator has a gear box and drive motor.
5	Waste Water	1	Nos	5.0 m X 6.0 m (H)	1.5	1) Vertical Type

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	Tank Agitator					2) Each Agitator has a gear box and drive motor.
6	Absorber Area Drain Sump Agitator	1	Nos	3.6 m X 4.0 m (H)	1	1) Vertical Type 2) Each Agitator has a gear box and drive motor.
7	Gypsum Area Drain Sump Agitator	1	Nos	3.6 m X 4.0 m (H)	1	1) Vertical Type 2) Each Agitator has a gear box and drive motor.
8	Limestone Area Drain Sump Agitator	1	Nos	3.6 m X 4.0 m (H)	1	1) Vertical Type 2) Each Agitator has a gear box and drive motor.
9	Process water Tank Agitator	1	Nos	4.5 x 4.5	1	1) Vertical Type 2) Each Agitator has a gear box and drive motor.

1.3.33.2 Erection of Dosing System for Waste Water Neutralization is included in the scope of works of the vendor.

1.3.33.3 Following Material Handling Equipments are included in scope of works

SL No	Description	Quantity	Unit	Dimensions (each) L X B X H (M)/Dia	Weight (Each) Tons	Operating Weight
1	Electric Hoist for Cake and Cloth Washing Pump	1	Nos	2X2X2	1.5	10
2	Electric Hoist for Vacuum Pump	1	Nos	2X2X2	1.5	5
3	Electric Hoist for Vacuum Belt Filter	1	Nos	1.5X1.5X1.5	1	5
4	Electric Hoist for Hydro Cyclone	1	Nos	1.5X1.5X1.5	1	3
5	Special Manual Hoist	2	Nos	1X1X1	1	2

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The material handling equipments are supplied in as a package, the fabrication, of the structure, erection of the hoists as per the approved drawing and commissioning is included in the scope of work.

1.3.33.4 Agency shall receive the material at site as per identified scope of supply, which includes unloading at site and storing and preserving it till the time it is handed over to customer.

1.3.33.5 Ensuring the proper storage and preservation requirements shall be followed as per OEM recommendations and O&M Manuals of respective equipment, the project specifications and standard design practices.

1.3.33.6 Supply of paint and paint of the structure including the touch up of the equipment is in the scope of the vendor.

1.3.33.7 Supply of consumables: 1 to 2 liters of IS VG 46 grade oil is required as lubricant for gear box of agitator assembly of one tank. Total there are 9 to 10 nos of agitators applicable, accordingly 25 liters of oil shall be considered for the agency for supply.

1.4 Scope of work with respect to execution of the prefabricated structural works at TP -9 at 1x800MW TPS, Kothagudem

1.4.1 Handling of the materials at fabrication yard, transportation to site of erection, erection, alignment, welding, supply and application of painting of the prefabricated structural works at TP -9 at 1x800MW TPS, Kothagudem.

1.4.2 The detailed BOQ of prefabricated structures is indicated in the Chapter-IX. The quantity is indicative, however the contractor has to complete the balance works in TP-9 in all respect as per the drawings/BHEL Engineer Instruction and handover, within the quoted rates.

1.4.3 82 MT of Structural members including the Columns, Bracing and Tie Beams in fabricated and painted conditions are kept ready for erection. Erection for the same are to be carried out from EL +56.940 m to 75m by arranging suitable higher capacity crane. The crane alone shall be provided by BHEL for the erection of the structure, all other TnP shall be arranged by the vendor for completion of the structure.

1.4.4 Fixing the balance 877 Sqm of cladding sheet from EL +56.940 to +75 m. any patch work apart from the mentioned 877 Sq Mts shall also to be completed by the contractor with in the quoted rates.

1.4.5 Fixing the balance 5 MT of GI hand rails from EL +56.940 to +75 m.

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- 1.4.6 Any other works required to be completed in the existing structure for the final handing over of the structure to the end customer shall be completed by the contractor as per the direction of the BHEL Engineer.
- 1.5 Scope of Works with respect to carry out Operation & Maintenance and Attending the faults, rectification, breakdown / planned maintenance for 11KV construction power supply system by Deploying One C-Grade Licensed Supervisor along with qualified electricians round the clock.**
(D): -
- 1.5.1 TSGENCO/KTPS has provided 11KV power supply source point from 33KV/11KV substation for FGD construction works. BHEL/KTPS has carried out the civil foundation work for 500KVA transformer, HT cable laying from substation to transformer, erection of LT kiosk and commissioned the transformer & LT kiosk.
- 1.5.2 There may be frequent outage of 11KV power supply due to earth fault during construction activities. Supervisory services are required for attending the faults, rectification, breakdown / planned maintenance, to carry out the activities, site requires experienced manpower for Operation & Maintenance and attending the faults, rectification, breakdown/planned maintenance for 11KV construction power supply.
- 1.5.3 The deployed supervisor shall have a valid C-Grade License which shall be valid during the time of deployment and shall be extended thereafter for the duration of the contract.
- 1.5.4 The total duration for deployment of above manpower shall be the same as the time duration of the main contract. However, BHEL at its own discretion may discontinue the services with one-month prior notice to contractor.
- 1.5.5 The payment to the above manpower at the end of the month shall be made in terms of man-day accounted for the month calculated as per the actual deployment of the personals at site.
- 1.5.6 BHEL shall provide the required spare materials to the contractor on free of cost for attending/ rectification of electrical faults. However, the required minimum electrician tools like spanners set, Allen key set, ELCB tester, IR tester (having range 500V, 1000V & 2.5KV), multi meter, consumables like insulation tapes, cotton waste etc. may be provided by the contractor.
- 1.5.7 Deployment of Manpower required is as below.
- a) Supervisor having C grade license – 1no.
 - b) Electricians for operating in 2 shifts – 2nos. (1no. in each shift).
- 1.6 Painting:** The scope of work shall include supply and application of touch up, preservative and final painting for all the components under the scope of work for the FGD equipments as per the contract.

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VOLUME-IA PART – I CHAPTER – III FACILITIES & CONSUMABLES IN THE SCOPE OF CONTRACTOR / BHEL (SCOPE MATRIX)

Sl. No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1.1.0	ESTABLISHMENT			
1.3.1.1.1	FOR CONSTRUCTION PURPOSE:			
A	Open space for office	Yes		Free of charges as provided by TSGENCO
B	Open space for T&P	Yes		Free of charges as provided by TSGENCO
C	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	At bidder's own cost
D	Bidder's all office equipment's, office / store / canteen consumables		Yes	At bidder's own cost
E	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	At bidder's own cost
F	Firefighting equipment's like buckets, extinguishers etc.		Yes	At bidder's own cost
G	Fencing of storage area, office, canteen etc. of the bidder		Yes	At bidder's own cost
1.3.1.1.2	FOR LIVING PURPOSES OF THE SUCCESSFUL BIDDER'S PERSONNEL			
A	Open space for labour colony		Yes	
B	Living accommodation		Yes	

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Sl. No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1.2.0	ELECTRICITY			
1.3.1.2.1	Electricity For construction purposes	Yes		Free of charges as provided by TSGENCO
1.3.1.2.1.1	Single point source	Yes		
1.3.1.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	At bidder's own cost
1.3.1.2.2	Electricity for the office, stores, canteen, labour colony, etc. of the bidder which include:		Yes	At bidder's own cost
1.3.1.2.2.1	Distribution from single point including supply of materials and service		Yes	At bidder's own cost
1.3.1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	At bidder's own cost
1.3.1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	At bidder's own cost
1.3.1.2.2.4	Demobilization of the facilities after completion of works		Yes	At bidder's own cost
1.3.1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc. on the above lines. (in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
1.3.1.3.0	WATER SUPPLY			
1.3.1.3.1	For construction purposes:	Yes		Free of charges as provided by TSGENCO

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Sl. No.	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1.3.1.1	Making the water available at single point	Yes		Free of charges as provided by TSGENCO
1.3.1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	At bidder's own cost
1.3.1.3.2	Water supply for bidder's office, stores, canteen, labour colony, etc.		Yes	At bidder's own cost
1.3.1.3.2.1	Making the water available at single point		Yes	At bidder's own cost
1.3.1.3.2.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	At bidder's own cost
1.3.1.4.0	LIGHTING			
1.3.1.4.1	For construction work (supply of all the necessary materials) At office storage area At the construction site / area		Yes	At bidder's own cost
1.3.1.4.2	For construction work (Execution of the lighting work / arrangements) At office storage area At the construction site /area At the labour hutment		Yes	At bidder's own cost
1.3.1.5.0	COMMUNICATION FACILITIES for site operations of the bidder	-		
1.3.1.5.1	Telephone, Fax, internet, intranet, email etc.		Yes	At bidder's own cost

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1.3.2.	CONSTRUCTION FACILITIES			
1.3.2.1.0	Engineering works for construction			
1.3.2.1.1	Providing the construction drawings for all the equipment covered under this scope			NA
1.3.2.1.2	Detailing of drawings for construction			NA
1.3.2.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small-bore pipes			NA
1.3.2.1.4	Shipping lists etc. for reference and planning the activities	Yes	Yes	”
1.3.2.1.5	Preparation of site construction schedules and other input requirements			NA
1.3.2.1.6	Review of performance (Form-14) and revision of site construction schedules in order to achieve the end dates and other commitments.		Yes	NA
1.3.2.1.7	Weekly construction schedules based on SI No 1.3.2.1.5		Yes	NA
1.3.2.1.8	Daily construction / work plan based on SI No 1.3.2.1.7		Yes	For daily monitoring meeting at site
1.3.2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works is completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	On intimation by BHEL at Bidder's Cost.
1.3.2.1.10	Preparation of preassembly bay, if any required			NA
1.3.2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the contractor / bidder himself			NA

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1.3.3 OPEN SPACE:

Open space, as provided by TSGENCO, will be provided to the bidder free of cost. Availability of land within plant boundary is very limited and the contractor has to plan and use the existing land considering the use of land by other Civil /mechanical/ electrical contractors and the storage of plant machineries and materials. The existing land shall be shared by all erection agencies. Land will be allocated with certain time frame and to the extent available/ considered necessary, and will be reviewed by BHEL depending upon the area availability. Area within plant premises for office, storage area etc. for construction purpose shall be provided as per availability free of cost. The contractor will be responsible for handing over back all lands, as handed over to him by BHEL.

Land for labor colony shall be provided by BHEL approximately nearer to site (outside plant boundary), on chargeable basis, as provided by TSGENCO. The contractor shall provide adequate water arrangement for drinking/washing/bathing with required toilets, drainage system, and electrification etc. in labour colony at his own cost. Suitable paved area, as & if directed by customer based on hygiene requirement of labour, to be provided in the labour colony at the cost of contractor.

1.3.4 ELECTRICITY:

- 1.3.4.1 Construction power will be provided to the contractor free of cost at one single point within the plant area by BHEL as provided by TSGENCO. The contractor has to provide necessary meter for measuring the power consumption. The contractor shall make his own arrangement for further distribution with necessary isolator/LCB. The contractor shall make his own arrangement for further distribution with necessary isolator/LCB etc.
- 1.3.4.2 Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.9 shall be provided by the contractor at his cost. Penalty if any levied by customer on this account will be recovered from contractor's bills.
- 1.3.4.3 Any duty, deposit involved in getting the Electricity shall be borne by the bidder. As regards contractor's office shed also all such expenditure shall be borne by the contractor.
- 1.3.4.4 Provision for distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.
- 1.3.4.5 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.
- 1.3.4.6 Contractor has to make their own arrangements for electricity requirement for labour colony at his own cost.

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1.3.4.7 As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction sites, contractor should make his own arrangement for alternative source of power supply. No separate payment shall be made for this contingency.

1.3.5 WATER:

1.3.5.1 Water (Raw water) required for construction purposes will be provided at one single point within the plant area free of cost as provided by TSGENCO. The required pumps & accessories, pipes for drawing water from the given point and further distribution will be arranged by the contractor at their cost to go on without interruptions.

1.3.5.2 In case of non-availability of water, the contractor shall make his own arrangements of water suitable for construction purpose to have uninterrupted work. No separate payment shall be made for any contingency arrangement made by contractor, due to delay / failure for providing water supply.

1.3.6 DRINKING WATER

1.3.5.3 Bidder shall provide drinking water at their cost.

1.3.7 ONLINE SITE CONSTRUCTION MANAGEMENT SYSTEM [SCMS]:

1.3.5.4 Contractor has to provide minimum 1 computer [along with one operator per PC] for online material management, reporting of daily progress, billing and other similar activities, within the quoted rate. Computers shall have minimum configuration of Windows 7 OS, 4GB RAM and Internet Explorer 8 or above.

1.3.8 MATERIAL SUPPLY:

BHEL will supply the materials/equipments indicated in the weight schedule from their respective manufacturing units which are to be executed/incorporated in the permanent system. In addition, the material such as lube oil, grease, Ammonia required for commissioning the erected equipments and chemicals required for chemical cleaning of equipments will be supplied free of cost by BHEL. Raw material will be supplied by BHEL for fabrication and erection works.

1.3.9 LIGHTING FACILITY:

Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, pre assembly/fabrication yard and contractor's material storage area etc. at his cost.

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1.3.10 CONSUMABLES:

1.3.5.5 Such of those consumables as indicated as consumables provided by BHEL alone will be provided to the contractor by BHEL free of charge for erection activities. Other required consumables like electrodes, all gases, and other materials for this scope of work are to be arranged by the contractor at their cost. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.

1.3.3.1 The bidder shall use the Customer approved quality welding electrodes only. The contractor shall provide within finally accepted price / rates, all consumables like welding electrodes (including alloy steel and stainless steel), all gases (inert, welding, and cutting), soldering material, dye penetrants, radiography films. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding and pre-assembly materials, hardware items etc required for temporary works such as supports, scaffoldings, bed are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers for temporary work, required for completion of work except those which are specifically supplied by manufacturing unit are also to be arranged by him.

1.3.3.2 All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost.

1.3.4 ELECTRODES SUPPLY AND STORAGE

1.3.4.1 The bidder shall use the Customer approved quality welding electrodes only.

1.3.4.2 It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL, details regarding type of electrodes, batch number and date of expiry etc.

1.3.4.3 Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate.

1.3.4.4 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at their own cost by the contractor.

1.3.5.6 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at their own cost by the contractor.

1.3.5.7 All low hydrogen electrodes shall be baked / dried in the electrode drying oven (range 375 deg. C - 425 deg. C) to the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by contractor at his cost.

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- 1.3.5.8 In case of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the contractor's first subsequent bills at market value plus departmental charges of BHEL communicated from time to time. Postponement of such recovery is not permitted.
- 1.3.5.9 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date of expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.

1.3.11 OTHER FACILITIES

- 1.3.5.10 Adequate water less urinals [at least 2 nos per level at suitable locations] shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas with proper disposal arrangement.

1.3.12 BID DRAWINGS

Bid drawings published in this tender specification are for information and this may get revised during execution.

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VOLUME-IA PART – I CHAPTER – IV

T&P'S AND MMES TO BE DEPLOYED BY CONTRACTOR

- 1.4.1 All other tools & plants required for execution of this scope of work are to be arranged by the contractor within the quoted rates except the T&Ps to be made available by BHEL to contractor free of hire charges on sharable basis.
- 1.4.2 Tentative List of minimum major Tools & Plants to be deployed by the contractor is mentioned below:

Sl No	T&P Description	Capacity in MT	Qty in Nos
1	Next Gen Pick and Carry Cranes	Minimum Capacity 14 MT (Mobile)	As required
2	Trailer	Minimum Capacity 20 MT	As required
3	Hydro Test pump for hydro	up to 50 Kg/Sq.cm	As required

- 1.4.3 Fill pumps shall be arranged by the contractor, wherever required.
- 1.4.4 For Hydro testing, necessary Hydraulic Test pumps/ Hand pumps are to be arranged by the contractor as indicated above.
- 1.4.5 All the T & P, lifting tackles including wire ropes, slings, shackles and electrically operated equipment shall be got approved by BHEL Engineer before they are actually put on use. Test certificates obtained from the statutory authority should be submitted before their usage.
- 1.4.6 For handling at store and transportation, contractor shall make his own arrangement.
- 1.4.7 Contractor shall ensure that all the T&Ps deployed shall be in good working condition which includes the T&Ps viz. Blast cleaning accessories with compressor along with Corrugated Galvanized Iron shed, Painting Equipment along with accessories, Plate Bending machine, Ultrasonography or Radiography or any other NDT equipments as required for fabrication of tanks and structural works.
- 1.4.8 The contractor has to furnish a list of Tools and plants including cranes / tractors / trailers / trucks etc. which he has proposed to deploy for this work.
- 1.4.9 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes. The crane load test has to be conducted as per statutory guidelines before deployment.
- 1.4.10 The contractor shall arrange crane operator, diesel, petrol and other consumables required for their tools and plants, equipments etc. Preventive and routine maintenance of T & P are also to be arranged by the contractor at his cost without any delay. Required number of

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experienced mechanics and helpers for routine maintenance of the above cranes shall be provided by the contractor within his quoted rate.

1.4.11 If work gets delayed due to non-availability of any T & P, BHEL reserves the right to get the work done at the risk and cost of contractor.

1.4.12 In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make alternative arrangement at the risk and cost of the contractor.

1.4.13 In the event of non-mobilization of Tools, Plants, Machinery, Equipment, Material or non-availability of the same owing to breakdown and as a result progress of work suffered, BHEL reserves the right to make alternative arrangement (available or higher capacity) in line with SCC clause no. 4.2.1.7 and hire charges shall be applicable as under:

Case 1: BHEL provides its own Capital T&P: If BHEL provides owned T&P then BHEL, hire charges (as per BHEL norms) will be recovered from the contractor as per the prevailing BHEL Corporate hire charges applicable (as enclosed in Chapter 4 of Part II Volume IA-Technical Conditions of Contract Volume I Book I) as per following cases:

- In case the T&P is specifically listed in “T&Ps to be deployed by Contractor”, ‘Rates of hire charges applicable to outside agencies other than contractors working for BHEL’ will apply.
- In case the T&P is not specifically listed in “T&Ps to be deployed by Contractor”, ‘Rates of hire charges applicable to contractors working for BHEL’ will apply.
- The hire charges of Capital Tools & Plants are exclusive of operating expenses e.g., Operator, fuel & Consumables and the same shall be arranged by the contractor at his cost.

Case 2: BHEL provides hired T&P: In all cases other than that specified in Case 1 above, actual expenses incurred by BHEL along with applicable overheads will be back-charged to the contractor

- The present rates of BHEL’s Corporate Crane hire charge, are enclosed in Chapter _ of part II of Technical Conditions of Contract (Volume-IA Book-I). This may get revised further as per the BHEL corporate guidelines. The prevailing rates as on date of execution shall be applicable.

1.4.14 T&Ps mentioned above is tentative requirement considering parallel working in all areas mentioned in the scope of work. However, mobilization schedule and quantity / numbers as mutually agreed at site for major T&Ps, have to be adhered to. Numbers/ time of requirement of T&Ps will be reviewed time to time by BHEL site and contractor will provide required T&Ps / equipments to ensure completion of entire work within schedule / target date of completion without any additional financial implication to BHEL. Vendor will give advance intimation and certification regarding capacity etc. prior to dispatch of heavy equipments. Also on completion of the respective activity, demobilization of T&P in total or in part can be done with the due approval of the engineer incharge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.

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VOLUME IA PART – I CHAPTER V T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

- 1.5.1 List of T&Ps to be made available by BHEL to contractor free of hire charges on sharable basis are as below:

SI No	Description	Quantity
1	In addition to the cranes to be provided by the contractor, BHEL will provide cranes of 75T or above capacity to the contractor as per site requirement on sharing basis free of hire charges.	As decided by BHEL
2	Air Blower for Air Leak Test	As Required
3	Venturimeter	As Required

- 1.5.2 All the T&Ps mentioned in clause 1.5.1 above shall be given to contractor on sharable basis and the allotment is made by BHEL on need basis. Decision of BHEL engineer will be final on the above.
- 1.5.3 Besides the T & P mentioned above, which is being made available to the contractor on free of hire charges, any other T & P which may be required for successful and timely execution of the work covered within the scope of this tender shall be arranged and provided at site by the contractor at his cost. In case if the contractor fails to provide such equipment's, BHEL will arrange for the same and the cost will be recovered from the contractor's bill with BHEL overheads, as applicable from time to time which may vary even during contract period.
- 1.5.4 Levelled land in FGD & TP9 area will be provided by BHEL/Customer for the cranes. Consolidation of the ground, if required, and preparation (including civil works and supply of required consolidation materials) for placing crane for operation shall be done by the contractor, at his cost. Necessary plates / sleepers if any required for marching and placing of crane for operation shall also be provided by the contractor within quoted rates.
- 1.5.5 BHEL may provide either owned cranes or hired cranes at the discretion of BHEL as below:
- 1.5.5.1 In the event of providing BHEL Cranes:
- 1.5.5.1.1 For all BHEL's crane, BHEL shall provide crane operator, free of charges. Fuel to be provided by the contractor within the quoted rate. All consumables for the BHEL crane maintenance shall be provided by the contractor within the quoted rates.
- 1.5.5.1.2 Tentative list of consumables required to be provided by contractor is as below:

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- Engine Oil 15 W 40
- Fuel Filters
- Air Filters
- Hydraulic Filters
- Hydraulic Oil –Servo 68
- Gear Oil- Servo 90
- Engine oil Filter
- Oil Separator Filter
- Rope- CRG 100 Grease
- Grease- Servo Multi-Purpose Grease

1.5.5.1.3 Maintenance for the BHEL crane shall be carried out by BHEL. Bidder shall extend support (if required) required for routine maintenance works

1.5.5.2 In the event of providing hired cranes:

1.5.5.2.1 Crane Operators for hired cranes will be provided by BHEL, on free of charges.

1.5.5.2.2 Fuel for cranes is to be arranged by the contractor within the quoted rate.

1.5.6 All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections for the BHEL issued T & Ps shall have to be arranged by the contractor at his cost.

1.5.7 Any loss / damage of tools by the contractor shall have to be replaced or otherwise cost thereof shall be recovered from the contractor.

1.5.8 In case of non-availability of these equipments, due to any reason i.e., unavoidable breakdown, major overhaul or any other reason etc., the contractor should make arrangement at his own cost to meet the erection targets. No extra claim will be admitted due to non-availability of any of the above equipments. No delay in execution of work shall be accepted on this account.

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VOLUME – IA PART – I CHAPTER-VI TIME SCHEDULE

1.6.1 TIME SCHEDULE

- 1.6.1.1 The entire work covering erection of FGD, fabrication and erection of tanks for FGD, Material handling & balance erection of TP-9, including Supply & Application of all types of Painting including the Final Painting and the Supervision Services for Deployment of Supervisor to maintain the Construction Power as elaborated in relevant chapter of this book in accordance to the rate schedule as detailed in the Tender Specification shall be completed within 15 (Fifteen Months) from the date of commencement of work at site.
- 1.6.1.2 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events
- 1.6.1.3 The work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.
- 1.6.1.4 The contractor is required to refer Form F15 in Volume-I Book -II for all the instructions to be taken immediately after receipt of LOI.

1.6.2 MOBILISATION

- 1.6.2.1 Contractor shall mobilize necessary resources as per letter of Intent or as per directive of Construction manager. Contractor shall also follow the Technical Conditions of Contract (Volume-IA Book- I) and in case of discrepancy the decision of BHEL engineer is final and binding on contractor.
- 1.6.2.2 In order to meet the schedule in general, and any other intermediate targets set, to meet customer/ project schedule requirements, Contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL Engineer.
- 1.6.2.3 The activities for erection, testing etc. shall be started as per directions of Construction manager of BHEL. The contractor has to augment their resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:
- 1.6.2.4 In case the project is to be advanced, the erection works in the scope of the contractor is to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.

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1.6.2.5 The Contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules. The schedule of important milestones is as follows:

Milestone Activity	FGD Package
Erection Start	1 st Month
Air Tightness Test for Complete Ducting	9 th Month
Completion of Erection work of FGD System	10 th Month
Commissioning of FGD	12 th Month
Balance work completion, pending points, punch points liquidation	15 th Month
Intermediate Milestones	
Air Tightness Test for Complete Ducting (M1)	5 th Month
Commissioning of FGD (M2)	12 th Month

PENALTY FOR INTERMEDIATE MILESTONES

M1 and M2 shall be intermediate for respective works under each package.
In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones with reference to Form 14.
Incase delay in achieving M1 milestone is solely attributable to the contractor, 0.5% per week of executable contract value* limited to Maximum 2% executable contract value will be withheld.
Incase delay in achieving M2 milestone is solely attributable to the contractor, 0.5% per week of executable contract value* limited to maximum 3% of executable contract value will be withheld.
Amount already withheld, if any, against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 milestone.
Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @ 10% of RA Bill amount from subsequent RA bills.
Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure of contract. Withheld amount, if any due to slippage of intermediate milestones shall be adjusted against LD or released as the case may be.
In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted in to recovery.
Note: * Executable contract value-value of work for which inputs/fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.

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1.6.3 **COMMENCEMENT OF CONTRACT PERIOD**

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy the decision of BHEL engineer is final.

1.6.4 **CONTRACT PERIOD**

The contract period for completion of entire work under scope shall be 15 (Fifteen months only) months from the —COMMENCEMENT OF CONTRACT PERIOD as specified earlier.

1.6.5 **GUARANTEE PERIOD**

The guarantee period of Twelve months for workmanship shall commence from the date of handing over of the FGD to Customer (Provided all erection, testing, and commissioning works are completed in all respects).

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VOLUME-IA PART-I CHAPTER - VII TERMS OF PAYMENT

1.7.1 Terms of Payments for the Material Handling Contract (A)

1.7.1.1 The accepted 'Rate per MT of materials' shall be paid on completion of the activities mentioned in the following table on pro-rata basis.

Sl. No	Description of Activity	% of payment
1	COMPLETION OF THE FOLLOWING ACTIVITIES OF THE UNLOADED MATERIALS RECEIVED THROUGH TRUCKS / TRAILERS:	
1.a	Unloading / Loading / Shifting of materials at open/ covered	62%
1.b	Updating of receipt or dispatch or shifting details, in store material registers /	10%
1.c	Stacking and /or verification	10%
1.d	Updating of verification details in material stock registers, submission of reports as per specified formats for shortage/ open delivery, lodging of police report, documents for insurance claims etc., and preparation of material receipt certificates in prescribed formats wherever applicable	10%
1.e	Identification of material in ready to lift position for issue to BHEL / erection agency, or to dispatch or to shift and updating of issue details in stores records / BHEL MM System	5%
1.f	Completion of contractual obligations	3%
	Total	100%
2	PENALTY LEVIABLE IN MONTHLY RA BILL IN CASE OF FOLLOWING NON COMPLIANCES-	
2.a	Removal of grass / weeds and other plant growth in the store area	1%
2.b	Safety + temporary illumination of working area where materials are handled	1%
2.c	Completion of Documentation planned for the month, related to MM system	2%
2.d	Penalty per truck per day (over and above two days) for not unloading the materials within two days of receipt delay is	Rs.500.00
2.e	Loss of materials, damages due to carelessness, negligence of the contractor	2%
2.f	Completion of Loading of outgoing materials to be dispatched to other places based on BHEL instruction	1 %

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- 1.7.1.2 No other payment shall be paid for the other / additional T & Ps deployed for carrying out the work as per the scope of this tender.
- 1.7.1.3 The contractor shall submit his bills once in a month duly furnishing the following minimum information along with other details as applicable.
- a. The gross weight as per RR/LWB / PWB
 - b. RR/PWB/LWB Number
 - c. Wagon/Vehicle/truck number and number of bundles/boxes/piece in each vehicle/truck / Wagon
 - d. Shortage / damage reports in BHEL's standard material / management form.
 - e. Rate / per tonne
 - f. Amount claimed.
 - g. Recoveries such as hire charges etc.,
 - h. RR Incase materials are received in railway wagons
 - i. Crane and trailer log sheets
 - j. Compliance report of the audit that shall be conducted every month by BHEL nominated committee. The audit shall be carried out for compliance with respect to the BHEL's procedure for material stacking, preservation etc., covered under the scope of this tender.
 - k. Upto date updating of Receipt / Issue details on BHEL MM Package / SCMS System as decided by BHEL.

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1.7.2 Terms of Payments for the Erection Testing and Commissioning of FGD Mechanical (B)- Progressive payment against Monthly running bills will be made to 85% of the value of the erected Pro-rata as per CI No 1.7.2.1.1 to 1.7.2.1.10 of the following table :-

1.7.2.1 Pro Rata Payment

SI NO	Rate Schedule Identification	Structure	Non-Pressure Parts (Ducts/Dampers etc.)	Rotating M/c	Pre Fabricated Tanks - Erection	Tanks-Fabrication and Erection	Insulation a. Iron Components b. Wool Mattress c. Al Sheets	Piping CS Piping SS Piping
		1A	2A	3A	4A	4B	(5A,5B,5C)	6A,6B)
1.7.2.1	Pro Rata Payment (85%)							
1.7.2.1.1	On Pre Assembly wherever applicable (if not applicable, this portion shall be clubbed with placement in position)	20%	20%	15%	20%	Marking and Cutting -10% Edge Preparation-10% Rolling-10%		15%

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1.7.2.1.2	Placement in position of preassembled (equipment/pipe/instruments wherever applicable)	20%	20%	20%	20%		50%	15%
1.7.2.1.3	Alignment	20%	20%	20%	20%		15%	15%
1.7.2.1.4	Welding, Bolting/Grouting/Fixing	20%	20%	20%	25%	10%	20%	20%
1.7.2.1.5	Completion of non-destructive examination & Stress Relieving/Heat Treatment (If applicable, then this portion to be paid along with welding)	5%	5%			10%		5%
1.7.2.1.6	Hangers & Support etc. whichever is necessary as per dwg.							5%
1.7.2.1.7	Surface preparation of tanks for painting					10%		
1.7.2.1.8	Painting					10%		5%
1.7.2.1.9	Hydraulic Test					15%		5%
1.7.2.1.10	Equipment Trial Run			10%				

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	Total pro rata payments Total 85%	85%	85%	85%	85%	85%	85%	85%
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1.7.2.2 Further 15% payment on pro-rata basis common to all PGs shall be released on achievement of the following stage/milestone events (as per clause no 1.7.2.1.1 to 1.7.2.1. of the following table) for the tonnage erected.

1.7.2.2	Stage/Milestone payments (15%)	% Payment
1.7.2.2.1	Completion of Air & Gas Tightness test for ducts	2%
1.7.2.2.5	Commissioning/Trial Run of FGD System	5%
1.7.2.2.6	Area Cleaning, Temporary Structures Removal and cutting/removal and return of Scrap	2%
1.7.2.2.7	Punch Point Completion	2%
1.7.2.2.8	Material Reconciliation	2%
1.7.2.2.9	Completion of Contractual Obligation	2%

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1.7.3 Terms of Payment for the completion of the TP-9 Structure-Part (C)

1.7.3	Stage/Milestone payments	% Payment
1.7.3.1	Erection completion of the Structure including placement, alignment and Welding of the structure.	50%
1.7.3.2	Final Handing over of the Structure after completion of painting, sheeting and completion of punch points	50%

1.7.4 Terms of Payment for Maintenance of LT Construction Power Supply-Part (D)

1.7.4	Payment for Supervisory Services	Payment/Per Month
1.7.4.1	Monthly rate for maintaining the Construction power supply by deploying the required personnel as per the tender conditions	100%

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VOLUME-IA PART-I CHAPTER-VIII TAXES AND DUTIES

1.8.1 Goods and Service Tax (GST) & Cess

- 1.8.1.1 The successful bidder shall furnish proof of GST registration with GSTN Portal in the State in which the Project is being executed, covering the services under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by the successful bidder on BHEL for this project/ work.
- 1.8.1.2 Contractor's price/rates shall be exclusive of GST & Cess (if applicable) (herein after termed as GST). Contractor shall submit to BHEL the GST compliant tax invoice/debit note/revised tax invoice on the basis of which BHEL will claim the input tax credit in its return. Since this is a works contract, the applicable rate shall be @ 18% GST, as applicable presently.
- 1.8.1.3 Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules wherein the 'Bill To' details will be as below:
BHEL GSTN: 36AAACB4146P1ZG
NAME - BHARAT HEAVY ELECTRICALS LIMITED
ADDRESS – BHEL SITE OFFICE, KOTHAGUDEM THERMAL POWER STATION
STAGE-VII, UNIT#12, PALONCHA KOTHAGUDEM, TELANGANA
- 1.8.1.4 GST charged in the tax invoice/debit note/revised tax invoice by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return.
- 1.8.1.5 In case BHEL has to incur any liability (like interest / penalty etc.) due to denial/reversal / delay of input tax credit in respect of the invoice submitted by the contractor, for the reasons attributable to the contractor, the same shall be recovered from the contractor.
- 1.8.1.6 Further, in case BHEL is deprived of the Input tax credit due to any reason attributable to contractor, the same shall not be paid or Recovered if already paid to the contractor.
- 1.8.1.7 Tax invoice/debit Note/revised tax invoice shall contain all such particulars as prescribed in GST law and comply to the timelines for issue of the same. Invoices shall be submitted on time to the concerned BHEL Engineer In Charge.

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- 1.8.1.8 TDS under GST (if/ as & when applicable) shall be deducted at prevailing rates on gross invoice value from the running bills.
- 1.8.1.9 E-way bills / Transit passes / Road Permits, if required for materials / T&P etc., bought into the project site is to be arranged by the Contractor only.
- 1.8.1.10 BHEL shall not reimburse any amounts towards any interest / penalty etc., incurred by contractor. Any additional claim at a later date due to issues such as wrong rates / wrong classification by contractor shall not be paid by BHEL.
- 1.8.2 All taxes and duty other than GST & Cess
The contractor shall pay all (except the specific exclusion viz GST & Cess) taxes, fees, license charges, deposits, duties, tools, royalty, commissions, Stamp Duties, or other charges / levies, which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract and the same shall not be reimbursed by BHEL. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.
- 1.8.3 Statutory Variations
Statutory variations are applicable under the GST Acts, against production of proof. The changes implemented by the Central / State Government during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract.
- 1.8.4 New Taxes/Levies
In case Government imposes any new levy / tax after submission of bid during the tenure of the contract, BHEL shall reimburse the same at actual on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract.
- 1.8.5 Direct Tax
BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act.

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VOLUME – IA PART – I CHAPTER –IX WEIGHT SCHEDULE

1.9.1 Weight Schedule for Part A- Material Management

The Weight Schedule for the Material Unloading contract is Broadly mentioned in the table attached.

SI No	Unit	Broad Description of item	Weight in tonnage
1	BAP Ranipet	FGD, GGH, Piping, Structures, Gates Dampers, JAS, Nozzles, Agitator, Fan Etc	3000 MT
2	CFP Rudrapur	HT Bus Duct	50 MT
3	EDN Bangalore	Control Equipment, DCS Panels and C&I instruments	70 MT
4	EPD Bangalore	LT Pannels and Ducts	10 MT
5	HEP Bhopal	HT Switchgear, Motors	50 MT
7	Trichy Valves	Valves	10 MT
8	Piping Centre	Piping System	20 MT
9	HPEP Hyderabad	RC Pump, Day Silo, Wet Bowl Mills.	1400 MT
10	PE& SD Hyderabad	Agitator tanks, Tanks, Fire Fighting System	350 MT
11	TP Jhansi	Transformer	20 MT
12	PEM	Mechanical and electrical BOI	20 MT
13	PSSR	Structural & Reinforcement Steel	3000 MT
TOTAL TONNAGE(APPROXIMATELY)			8,000 MT

1.9.1.1 NOTE for MM works:

- The product list and the manufacturing units indicated above are indicative for estimation purpose only. The weight mentioned above is approximate and liable to vary as per design consideration of the manufacturing unit.
- The payment for Material handling works will be made at the quoted / accepted rates for the tonnage actually handled.
- Besides the products indicated above there is likelihood in addition of any products integral to FGD and its auxiliaries. Tenderers quoted rate shall be applicable for such products also.
- For the purpose of payment for Material handling works, the gross weight indicated in RR/LWB/PWB will be taken into account for calculating the tonnage handled. However, in

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case of full truck / Lorry load, Gross weight indicated in shipping / dispatch documents will be taken into account for this purpose. Where gross weight is not available in these documents, gross weight as assessed by BHEL Engineers will be taken into account and which is final for the purpose of payment.

- v) Preservation and storage of components will have to be done as per the instruction of BHEL engineers under Material handling works.

Note for weight schedule of fabrication, erection and commissioning works:

1. The weights mentioned above are approximate and liable to vary as per design consideration. There will be change in PG, weight, description etc. However, payments will be made for the tonnage actually erected at the quoted rate. Quantity Variation will be dealt as per clause 2.14 of General Conditions of Contract (Volume I Book II).
2. Besides PG / PGMA indicated in the weight schedule, there is likelihood of addition of product groups integral to FGD and its auxiliaries. The quoted rates shall be applicable for such product groups also.
3. The erection & dismantling of temporary piping, pumps, tanks, dummy plates & other miscellaneous equipment etc. for pre-commissioning and commissioning activities like hydraulic test, gas tightness test etc. are covered in this contract and shall be carried out as a part of work. There will not be any separate payment for these works.
4. The Erection of FAN MOTORS are covered in this scope of contract.
5. The erection and dismantling of air blowers and connecting pipes and ducts, providing blanks / dummies at the required locations and conducting gas tightness test is in the scope of the contract and shall be carried out within the quoted rate.

1.9.2 Weight Schedule for Part B- FGD Mechanical

SL No	Description	Weight (MT)	Rate Schedule
1	Structure	2686.88	1A
2	Non Pressure Parts/Ducts/Dampers	906.37	2A
3	Rotating Components/Machines	2212.15	3A
5	Fabrication and Erection of the Tanks from the Structural Materials (Plates, Structural Components) and Hydro Cyclones and Other Miscellaneous items	421.00	4A
6	Mineral Wool	105.05	5A
7	Fixing Components	132.62	5B
8	Aluminium Sheet & Sealing Compound	36.70	5C

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9	CS Piping	146.99	6A
10	SS Piping	8.00	6B
	Total	6655.76	MT

BILL OF QUANTITY

SI No	Unit	PGMA	PGMA Description	Est/ Rel Wt (in Kgs.)	Rate Schedule
1	BAP	52000	SPECIAL TOOLS/CONTRA	270.00	1A
2	BAP	55081	BUF FIX MATERIAL	3870.00	1A
3	BAP	55082	BUF STAIR & HND RAIL	1580.00	1A
4	BAP	55089	BUF MOTOR CANOPY	1320.00	1A
5	BAP	57466	PLATFORMS AND LADDERS	18820.00	1A
6	BAP	57566	PLATFORMS AND LADDERS-FGD GD	3990.00	1A
7	BAP	FW209	MAN HOLE DOOR FOR ABSORBER	9000.00	1A
8	BAP	FW214	ABS BAFFLE GRATING	1800.00	1A
9	BAP	FW219	ABSORBER SYSTEM-BASE	20640.00	1A
10	BAP	FW221	ABSORBER SYSTEM-CASING BOTTOM	74830.40	1A
11	BAP	FW222	ABSORBER SYSTEM-CASING TOP	117921.60	1A
12	BAP	FW231	ABSORBER SHEAR PLATE	4500.00	1A
13	BAP	FW232	DUCT SUP BYP & BUF/GGH	45000.00	1A
14	BAP	FW233	DUCT SUPPORT BUF/GGH & ABS	54000.00	1A
15	BAP	FW234	DUCT SUP ABS & STACK/BYP	54000.00	1A
16	BAP	FW235	SPECIAL FASTNERS	3600.00	1A
17	BAP	FW236	STRUCTURES FOR RC PUMP HOUSE	133081.60	1A
18	BAP	FW238	HOOK UP DUCT WITH STRUCTURE	22500.00	1A
19	BAP	FW255	DUCT BYP & BUF/GGH/ABS	68570.00	1A
20	BAP	FW256	DUCT BUF/GGH & ABS	76180.40	1A
21	BAP	FW257	DUCT ABS & BYP/STACK	48020.00	1A
22	BAP	FW258	DUCT BETWEEN GGH AND DUCT OUT	332271.60	1A
23	BAP	FW259	GGH INTERCONNECT DUCT	54000.00	1A

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24	BAP	FW260	DUCT STR BYP & BUF/GGH/ABS	57030.00	1A
25	BAP	FW261	DUCT STR BUF/GGH & ABS	52150.00	1A
26	BAP	FW262	DUCT STR ABS & BYP/STACK	110581.60	1A
27	BAP	FW263	DUCT STRUCTURE BETWEEN GGH	80020.40	1A
28	BAP	FW280	FOUNDATION MATL FOR DUCT STRUC	20340.00	1A
29	BAP	FW281	FOUNDATION MATL FOR ABS	2380.00	1A
30	BAP	FW282	FOUNDATION MATL FOR ELEVATOR	3270.00	1A
31	BAP	FW283	FOUNDATION MATL RC PUMP SHED	4500.00	1A
32	BAP	FW285	SUPRTING STR FOR EMERGENCY QWT	13500.00	1A
33	BAP	FW297	PLATFORM FOR DUCT	9000.00	1A
34	BAP	FW298	PLATFORM FOR G&D	9000.00	1A
35	BAP	FW299	MISCELLANEOUS-FGD SYSTEM	4640.00	1A
36	BAP	FW300	ABSORBER COLUMNS	133081.60	1A
37	BAP	FW301	ABSORBER BEAMS AND BRACINGS	133081.60	1A
38	BAP	FW302	ABSORBER LOWER FLOORS	90000.00	1A
39	BAP	FW303	ABSORBER UPPER FLOORS	90000.00	1A
40	BAP	FW304	ABSORBER FLOOR GRILLS	58500.00	1A
41	BAP	FW305	ABSORBER STAIRS & HANDRAILS	31500.00	1A
42	BAP	FW306	ABSORBER HSFG FASTNERS	4500.00	1A
43	BAP	FW307	ABSORBER MISCELLANEOUS	9000.00	1A
44	BAP	FW310	STRU FOR BOOSTER FAN HANDLING	72000.00	1A
45	BAP	FW380	ELEVATOR COLUMN	54000.00	1A
46	BAP	FW381	ELEVATOR BEAM AND BRACING	22500.00	1A
47	BAP	FW382	ELEVATOR FLOORS	22500.00	1A
48	BAP	FW383	ELEVATOR STAIR AND HAND RAIL	9000.00	1A
49	BAP	FW384	ELEVATOR FLOOR GRILL	9000.00	1A
50	BAP	FW385	ELEVATOR M/C ROOM & GUIDE ,	9000.00	1A
51	BAP	FW386	INTER-CONNECTING PLTF TO ABS	9000.00	1A
52	BAP	FW610	GALLARIES & RAIL FOR ABSORBER	9430.00	1A
53	BAP	FW611	GALLARIES AND RAILINGS FOR GGH	45000.00	1A
54	BAP	FW612	GALLARIES AND RAILINGS FOR DAM	9000.00	1A
55	BAP	FW613	GALLARIES AND RAILINGS FOR DUC	9000.00	1A
56	BAP	FW709	TRENCH COVER PLATE	4500.00	1A
57	BAP	FW710	MONORAIL FOR HOIST & CRANES	36000.00	1A
58	BAP	FW713	CHAIN PULLEYS	18000.00	1A
59	BAP	FW714	HOISTS	45000.00	1A

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60	BAP	FW717	MAN HOLE DOOR	13500.00	1A
61	BAP	FW718	ROOF SHEETING	9000.00	1A
62	BAP	FW779	SUPPORTS FOR CABLE TRAYS/CONTR	18570.00	1A
63	BAP	FW781	START STOP PUSH BUTTON	900.00	1A
64	BAP	FW991	SPECIAL WELDING ELECTRODE	4500.00	1A
65	BAP	FW996	TOOLS & TACKLES	9000.00	1A
66	HPEP-Hyd	13365000002-00	vent silencer supporting structure	1053.00	1A
67	HPEP-Hyd	13365000003-00	DISCHARGE SILENCER SUPPORTING STRUCTURE	815.00	1A
68	HPEP-Hyd	13365000004-00	MAINTENANCE PLATFORM	260.00	1A
69	HPEP-Hyd	13365000005-00	SUCTION FILTER SUPPORTING ARANG	200.00	1A
70	HPEP-Hyd	13365000001-P1	MAIN PLATFORM BRACING	104.00	1A
71	HPEP-Hyd	13365000001-P2	FILTER SUPPORT BRACING	104.00	1A
72	HPEP-Hyd	AA1014883040	PLT CS 6 CHQD,1*2500.00*1000.00MM	133.00	1A
73	HPEP-Hyd	AA1014883040	PLT CS 6 CHQD,2*2000.00*1000.00MM	212.80	1A
74	HPEP-Hyd	AA1014883040	PLT CS 6 CHQD,1*2500.00*600.00MM	79.80	1A
75	HPEP-Hyd	AA1014883040	PLT CS 6 CHQD,2*2000.00*600.00MM	127.68	1A
76	HPEP-Hyd	33365000002-00	HAND RAIL	313.00	1A
77	HPEP-Hyd	13365000002-00	vent silencer supporting structure	1053.00	1A
78	HPEP-Hyd	13365000003-00	DISCHARGE SILENCER SUPPORTING STRUCTURE	815.00	1A
79	HPEP-Hyd	13365000004-00	MAINTENANCE PLATFORM	260.00	1A
80	HPEP-Hyd	13365000005-00	SUCTION FILTER SUPPORTING ARANG	200.00	1A
81	HPEP-Hyd	13365000001-P1	MAIN PLATFORM BRACING	104.00	1A

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82	HPEP-Hyd	13365000001-P2	FILTER SUPPORT BRACING	104.00	1A
83	HPEP-Hyd	AA1014883040	PLT CS 8 CHQD,1*2500.00*1000.00MM	172.25	1A
84	HPEP-Hyd	AA1014883040	PLT CS 8 CHQD,2*2000.00*1000.00MM	275.60	1A
85	HPEP-Hyd	AA1014883040	PLT CS 8 CHQD,1*2500.00*600.00MM	103.35	1A
86	HPEP-Hyd	AA1014883040	PLT CS 6 CHQD,2*2000.00*600.00MM	127.68	1A
87	HPEP-Hyd	33365000002-00	HAND RAIL	313.00	1A
88	HPEP-Hyd	33352500135-00	LIFTING TOOL FOR END COVER	60.00	1A
89	HPEP-Hyd	33352500136-00	LIFTING TOOL FOR SHEAR RING & C.COVERS	24.00	1A
90	HPEP-Hyd	TC9752404014	SUPPORT FRAME FOR DIAPHR(400 SERIES)	200.00	1A
91	HPEP-Hyd	TC9752414010	HYD EQPT FOR COUPLIN ASY/DISASY FIXT	15.00	1A
92	HPEP-Hyd	TC9752414028	HYD CYL- ENERPAC NO. RC 106	6.00	1A
93	HPEP-Hyd	Silo	Day Silo Fabricated Items	130000.00	1A
94	PESD	Material Handling	Electric Hoists for Cake & cloth washing Pump	1500.00	1A
95	PESD	Material Handling	Electric Hoist for Vacuum Pump	1500.00	1A
96	PESD	Material Handling	Electric Hoist for Vacuum belt filter	1000.00	1A
97	PESD	Material Handling	Electric host for Hydro cyclone	1000.00	1A
98	PESD	Material Handling	Manual Hoists	2000.00	1A
99	BAP	52041	HOT END CONN PLATE	34200.00	2A
100	BAP	52042	COLD END CONN PLATE	30600.00	2A
101	BAP	57141	SEAL AIR HAG AND ID FAN OUTGATE	10370.00	2A
102	BAP	57209	MTG BKT FOR CL DAMPER AIR CYL	1090.00	2A
103	BAP	57497	KNIFE GATE VALVE	1230.00	2A

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104	BAP	57540	GATE-FGD BOOSTER FAN INLET	61530.00	2A
105	BAP	57550	GATE-FGD BOOSTER FAN OUTLET	62650.00	2A
106	BAP	57570	GATE-FGD OUTLET	61910.00	2A
107	BAP	57577	ELECT ACTUATOR FOR GATE,DAMPER	17400.00	2A
108	BAP	57578	ELECTRICAL ITEMS FOR GATE,DAMP	20.00	2A
109	BAP	57583	DAMPER FGD BYPASS	44470.00	2A
110	BAP	FW201	ABSORB. RC PUMP NOZZLE	9000.00	2A
111	BAP	FW202	ABS NOZL NB 300 & ABOVE	9000.00	2A
112	BAP	FW203	NOZZLE NB25 TO NB250	9000.00	2A
113	BAP	FW207	OUTLET GUIDE VANE	9000.00	2A
114	BAP	FW213	ABSORBER SYSTEM INTERNALS	45000.00	2A
115	BAP	FW215	MIST ELIMINATOR & ACCESSORIES	36000.00	2A
116	BAP	FW216	ABS BAFFLE GRATING SUPP	36000.00	2A
117	BAP	FW217	ABS ME SUPPORT	36000.00	2A
118	BAP	FW218	ABS SPRAY PIPE SUPP	27000.00	2A
119	BAP	FW225	ABSORBER SYSTEM-RUBBER LINING	27000.00	2A
120	BAP	FW228	ABSORBER-W/D INTERFACE	8100.00	2A
121	BAP	FW229	W/D WASH SYSTEM	7200.00	2A
122	BAP	FW241	ABSORBER AGITATOR	13500.00	2A
123	BAP	FW251	EXPNSN JNT METALLIC	29320.00	2A
124	BAP	FW252	EXPNSN JNT NON METALLIC	4500.00	2A
125	BAP	FW264	LINING FOR GGH	1800.00	2A
126	BAP	FW265	LINING OF DUCT	9000.00	2A
127	BAP	FW293	ELEVATOR AND ACCESSORIES	7200.00	2A
128	BAP	FW322	ABSORBER SYSTEM-CASING INTERM	72000.00	2A
129	BAP	FW725	NOZZLES & FLANGES	27000.00	2A
130	BAP	FW798	AIR RECEIVERS	4500.00	2A
131	BAP	FW816	MANL BTRFLY VALV- UTLTY	2250.00	2A
132	BAP	FW817	MOTOR BTRFL VALV-UTLTY	1800.00	2A
133	BAP	FW818	PNEM BTRFLY VALV-UTLTY	900.00	2A
134	BAP	FW819	MAN BTRFLY VALV-LS SLRY	2700.00	2A
135	BAP	FW820	MOTOR BTRFLY VALV-LS SLRY	5400.00	2A
136	BAP	FW821	PNEUM BTRFLY VALV-LS SLRY	1800.00	2A
137	BAP	FW822	MAN BTRFLY VALV-GYP SLRY	4500.00	2A
138	BAP	FW823	MOTOR BTRFLY VALV -GYP SLRY	13500.00	2A

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139	BAP	FW828	MAN GATE VALV-UTLTY	18000.00	2A
140	BAP	FW829	MOTOR GATE VALV-UTLTY	4500.00	2A
141	BAP	FW834	MAIN GLOBE VALV-UTLTY	9000.00	2A
142	BAP	FW840	CERAMIV VALVES	900.00	2A
143	BAP	FW841	CONTROL VALVES	900.00	2A
144	BAP	FW842	MAN PINCH VALV-GYP SLRY	900.00	2A
145	BAP	FW845	BALL VALVES- WATER	900.00	2A
146	BAP	FW848	CHECK VALVES- WATER	900.00	2A
147	BAP	FW851	DIAPHRAGM VALV-SLURRY	900.00	2A
148	BAP	FW854	ROOT VALV INSTRMNTN	4500.00	2A
149	BAP	FW988	COMMISSIONING SPARES	18000.00	2A
150	Trichy Valves	XXXX	Valves from Size 1inch to 10 inch	12924.00	2A
151	HPEP-Hyd	TC9756446013	SUCTION AIR FILTER SILENCER 16"#150RF	320.00	2A
152	HPEP-Hyd	TC9756448016	DISCHARGE SILENCER OX BLOWER 14"150RF	1480.00	2A
153	HPEP-Hyd	TC9756446013	SUCTION AIR FILTER SILENCER 16"#150RF	320.00	2A
154	HPEP-Hyd	TC9756445017	BUTEERFLY VALVE CS 14"#150RF WAFER TYPE	60.00	2A
155	HPEP-Hyd	AA5710004006	ISO VG 46 GRADE OIL	1260.00	2A
156	HPEP-Hyd	TC9752549004	DIAPHRAGM ASSY/DIS-ASSLY FIX. W/O HD EQP	130.00	2A
157	HPEP-Hyd	BA9789132000	COMPLETE AGITATOR ASSEMBLY-WBM 2958	200.00	2A
158	HPEP-Hyd	BA9789132000	COMPLETE AGITATOR ASSEMBLY-WBM 2958	200.00	2A
159	HPEP-Hyd	BA9750140010	BF SHUTOFF GATE WITH ELECTRIC ACTUATOR	135.00	2A
160	PESD	Gypsum Dewatering System	Vacuum pumps with driver (IE3 motor), All connection bolts/nuts/washers for installation, Required instruments and any safety device. Necessary vibration isolators shall be provided to prevent the transmission of the dynamic loads on to the building structure.- 2 Nos	16000.00	2A

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161	PESD	Gypsum Dewatering System	Vent fan including enclosure and its arrangement- 2 Nos	2000.00	2A
162	PESD	Agitators	Auxiliary Absorbent Tank Agitator (1 No. Tank)	4500.00	2A
163	PESD	Agitators	Lime Stone Slurry Storage Tank Agitator- 2NOS	10000.00	2A
164	PESD	Agitators	Secondary Hydro cyclone Feed Tank Agitator	1500.00	2A
165	PESD	Agitators	FILTRATE WATER Sump AGITATOR	1000.00	2A
166	PESD	Agitators	WASTE WATER TANK AGITATOR	1500.00	2A
167	PESD	Agitators	ABSORBER AREA DRAIN SUMP AGITATOR	1000.00	2A
168	PESD	Agitators	GYPSUM AREA DRAIN SUMP AGITATOR	1000.00	2A
169	PESD	Agitators	LIMESTONE AREA DRAIN SUMP AGITATOR	1000.00	2A
170	PESD	Dosing	Dosing System	5000.00	2A
171	BAP	52010	LARG AH-ROTOR ASSY	81000.00	3A
172	BAP	52024	COLD BASKET&ELEMENT	282000.00	3A
173	BAP	52030	LARG AH-ROTORHOUSING	20250.00	3A
174	BAP	52101	LARG AH-AUX ROTDRIVE	4950.00	3A
175	BAP	52220	LARG AH-GENS DETAILS	11700.00	3A
176	BAP	52988	LARG AH COMMISSIONING SPARE	90.00	3A
177	BAP	55000	FAN TOOL & FIXTURE	410.00	3A
178	BAP	55084	BUF C & S AIR FAN	2700.00	3A
179	BAP	55287	1 STG BUF ROTOR	16890.00	3A
180	BAP	55587	1 STG BUF HOUSING	73170.00	3A
181	BAP	55880	BUF CPLNG	1800.00	3A
182	BAP	55980	BUF LUBE OIL SYS	3150.00	3A
183	BAP	55983	BUF ACTUATOR	72.00	3A
184	BAP	57491	BLOWER WITH MOTOR	3070.00	3A
185	BAP	FW701	SLURRY PUMPS & ACCESSORIES	67500.00	3A
186	BAP	FW702	WATER PUMPS & ACCESSORIES	27000.00	3A
187	BAP	FW753	SLURRY PIPE ACCESSORIES	187081.60	3A
188	BAP	FW815	RC PUMP INLT & OUTLT VALVE	54000.00	3A
189	HPEP-Hyd	ZC01-1044503200	BLOWER TRAIN& B.PLATE WITH PIPING ASY	35302.14	3A
190	HPEP-Hyd	23321200155-00P3	C2-COUPLING SPACERS AND LOOSE PARTS	2.00	3A

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191	HPEP-Hyd	23321200155-00P20	C2-CPLG SET OF SPARES (BOLTS,NUTS&SHIMS)	1.00	3A
192	HPEP-Hyd	23321100057-00P6	C1-COUPLING SPACERS AND LOOSE PARTS	4.00	3A
193	HPEP-Hyd	23321100057-00P20	C1-CPLG SET OF SPARES(BOLTS.NUTS&SHIMS)	1.00	3A
194	HPEP-Hyd	TC9754322090	CHARGING & TESTING KIT FOR ACCUMULATOR	10.00	3A
195	HPEP-Hyd	33360035026-00	SPREADER BAR L=5100	604.00	3A
196	HPEP-Hyd	AA7111124014	BOLT HEX M20X65-8.8	7.07	3A
197	HPEP-Hyd	AA7111122240	BOLT HEX M16X50-8.8	3.89	3A
198	HPEP-Hyd	HY9603163171	SPRING SUPPORT VAR (PEDESTAL)630/150	46.00	3A
199	HPEP-Hyd	ZC01-1044503300	BLOWER TRAIN& B.PLATE WITH PIPING ASY	35310.64	3A
200	HPEP-Hyd	23321200155-00P3	C2-COUPLING SPACERS AND LOOSE PARTS	2.00	3A
201	HPEP-Hyd	23321200155-00P20	C2-CPLG SET OF SPARES (BOLTS,NUTS&SHIMS)	1.00	3A
202	HPEP-Hyd	23321100057-00P6	C1-COUPLING SPACERS AND LOOSE PARTS	4.00	3A
203	HPEP-Hyd	23321100057-00P20	C1-CPLG SET OF SPARES(BOLTS.NUTS&SHIMS)	1.00	3A
204	HPEP-Hyd	33360035026-00	SPREADER BAR L=5100	604.00	3A
205	HPEP-Hyd	AA7111124014	BOLT HEX M20X65-8.8	7.07	3A
206	HPEP-Hyd	AA7111122240	BOLT HEX M16X50-8.8	3.89	3A
207	HPEP-Hyd	TC9756447010	VENT SILENCER INLET PIPE SIZE 250NB	548.00	3A
208	HPEP-Hyd	HY9603163171	SPRING SUPPORT VAR (PEDESTAL)630/150	46.00	3A
209	HPEP-Hyd	TC9765601018	QUENCHING NOZZLE WITH PIPE&FLANGE ASBLY	20.00	3A
210	HPEP-Hyd	43353900060-01MC	SHIM 0.1	1.09	3A

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211	HPEP-Hyd	43353900060-02MC	SHIM 0.2	2.18	3A
212	HPEP-Hyd	43353900060-03MC	SHIM 0.5	5.43	3A
213	HPEP-Hyd	43353900060-04MC	SHIM 1.0	10.87	3A
214	HPEP-Hyd	43353900060-01MC	SHIM 0.1	1.09	3A
215	HPEP-Hyd	43353900060-02MC	SHIM 0.2	2.18	3A
216	HPEP-Hyd	43353900060-03MC	SHIM 0.5	5.43	3A
217	HPEP-Hyd	43353900060-04MC	SHIM 1.0	10.87	3A
218	HPEP-Hyd	TC9752402011	CLEARANCE CHECK FIXTURE FOR ROTOR	100.00	3A
219	HPEP-Hyd	TC9752415016	COUPL ASSY&DISASSY FIXTURE FOR HUB D 50	50.00	3A
220	HPEP-Hyd	TC9752441017	HI. PR.OIL INJECT.PUMP ASSY.INCL.PR.GUAG	12.00	3A
221	HPEP-Hyd	TC9752515010	ROTOR ALIGNMENT FIXTURE DIA40,50 DBSE450	12.50	3A
222	HPEP-Hyd	TC9754302006	TOOL KIT FOR IT	60.00	3A
223	HPEP-Hyd	43353900001-00	FOUNDATION STUD M36X3X1000	241.80	3A
224	HPEP-Hyd	43353900059-01	SQ.WASHER(M36x3)	69.42	3A
225	HPEP-Hyd	43353900004-00	LEVELING BLOCK	88.40	3A
226	HPEP-Hyd	43353900005-00	SOLE PLATE	295.26	3A
227	HPEP-Hyd	43353900001-00	FOUNDATION STUD M36X3X1000	241.80	3A
228	HPEP-Hyd	43353900059-01	SQ.WASHER(M36x3)	69.42	3A
229	HPEP-Hyd	43353900004-00	LEVELING BLOCK	88.40	3A
230	HPEP-Hyd	43353900005-00	SOLE PLATE	295.26	3A

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231	HPEP-Hyd	GT9754229074	CONNECTOR TUBE MALE 1/2"X1/2"	1.00	3A
232	HPEP-Hyd	GT9754229988	CONNECTOR TUBE FEMALE 1/2"X1/2"	0.20	3A
233	HPEP-Hyd	GT9754229015	UNION TUBE 1/2"	0.40	3A
234	HPEP-Hyd	TC9755820566	SMART WP DPT 0- 0.13- 1.3 KG/CM2	15.00	3A
235	HPEP-Hyd	TC9755802010	SMART TEMP TRANSMITTER, WP	5.00	3A
236	HPEP-Hyd	AA7322031628	NI/CR- NI/ALTCTD,SD8,L=219,DUP,M20X1.5-M	0.80	3A
237	HPEP-Hyd	AA7326005141	THERMOWELL,SS,MP BLB 8,L1-150,N1=75	0.40	3A
238	HPEP-Hyd	HY2859993029	SIG CBL,1PX1.5,N-IS,CU,PVC/FRLS,IND SHLD	14.80	3A
239	HPEP-Hyd	HY7240193462	O RING VITON OD 1002 ID 988 TH 7	0.45	3A
240	HPEP-Hyd	HY7240193446	O RING VITON OD 962 ID 948 TH 7	0.21	3A
241	HPEP-Hyd	HY7240193284	O RING VITON OD 356.3 ID 342.3 TH 7	0.08	3A
242	HPEP-Hyd	HY7240198766	O RING VITON OD273.35 ID266.29 THK3.53	0.02	3A
243	HPEP-Hyd	HY7240198782	O RING VITON OD 261 ID 247 THK 7	0.05	3A
244	HPEP-Hyd	HY7240193039	O RING VITON OD 36.81 ID 29.75 TH 3.53	0.00	3A
245	HPEP-Hyd	HY5960261014	SILICON DIA 2.62	0.15	3A
246	HPEP-Hyd	TC9762673026	SET OF RTDS FOR GEARBOX-BHUSAWAL FGD	2.00	3A
247	HPEP-Hyd	06221500021-00	CHEEK WITH TRUNNION DE_DIA 2.9 M	6120.00	3A
248	HPEP-Hyd	06221500022-00	CHEEK WITH TRUNNION NDE_DIA 2.9 M	6107.00	3A
249	HPEP-Hyd	06221500038-00	MILL HALF SHELL MACHINING-DE	8430.00	3A

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250	HPEP-Hyd	06221500039-00	MILL HALF SHELL MACHINING-NDE	8410.00	3A
251	HPEP-Hyd	06221500038-00	MILL HALF SHELL MACHINING-DE	8430.00	3A
252	HPEP-Hyd	06221500039-00	MILL HALF SHELL MACHINING-NDE	8410.00	3A
253	HPEP-Hyd	BA9789123000	WBM LINERS FOR 17.15 TPH	1.00	3A
254	HPEP-Hyd	BA9789121008	TROMMEL SCREEN ASSEMBLY 17.15 TPH WBM	1.00	3A
255	HPEP-Hyd	BA9789047010	GIRTH GEAR FOR WBM 2958	7200.00	3A
256	HPEP-Hyd	BA9789110006	MILL CIRCUIT PUMP FOR WBM 2958	700.00	3A
257	HPEP-Hyd	BA9789125003	HYDRO CYCLONE ASSY 17.15TPH WBM	1.00	3A
258	HPEP-Hyd	BA9789119003	BALL CHARGE 17.15 TPH WBM	546000.00	3A
259	HPEP-Hyd	BA9789107005	LIME STONE WEIGH FEEDER&PNEMUNATIC DIV	8000.00	3A
260	HPEP-Hyd	BA9789123000	WBM LINERS FOR 17.15 TPH	1.00	3A
261	HPEP-Hyd	BA9789121008	TROMMEL SCREEN ASSEMBLY 17.15 TPH WBM	1.00	3A
262	HPEP-Hyd	BA9789047010	GIRTH GEAR FOR WBM 2958	7200.00	3A
263	HPEP-Hyd	BA9789110006	MILL CIRCUIT PUMP FOR WBM 2958	700.00	3A
264	HPEP-Hyd	BA9789125003	HYDRO CYCLONE ASSY 17.15TPH WBM	1.00	3A
265	HPEP-Hyd	BA9789119003	BALL CHARGE 17.15 TPH WBM	546000.00	3A
266	HPEP-Hyd	BA9789107005	LIME STONE WEIGH FEEDER&PNEMUNATIC DIV	8000.00	3A
267	HPEP-Hyd	06221500021-00	CHEEK WITH TRUNNION DE_DIA 2.9 M	6120.00	3A
268	HPEP-Hyd	06221500022-00	CHEEK WITH TRUNNION NDE_DIA 2.9 M	6107.00	3A
269	HPEP-Hyd	BA9789047029	PINION FOR WBM 2958	650.00	3A

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270	HPEP-Hyd	BA9711322153	LOW SPEED COUPING	300.00	3A
271	HPEP-Hyd	BA9789046006	MAIN REDUCER WITH LUBE OIL SYS	5500.00	3A
272	HPEP-Hyd	16270350682-00	BASE PLATE(MAIN REDUCER)	374.00	3A
273	HPEP-Hyd	46270350886-00	SPACER(MAIN MOTOR)	3.14	3A
274	HPEP-Hyd	26270350469-00	GAURD FOR COUPLING(MAIN REDUCER TO COUNT	65.24	3A
275	HPEP-Hyd	26270350467-00	COUPLING HOUSING(MAIN REDUCER TO MAIN MO	38.70	3A
276	HPEP-Hyd	BA9711322145	HIGH SPEED COUPING	300.00	3A
277	HPEP-Hyd	BA9750053001	G. G. GREASING SYSTEM	200.00	3A
278	HPEP-Hyd	BA9710100025	BALL FEEDING ASSEMBLY	1687.00	3A
279	HPEP-Hyd	BA9789080000	FOUNDATION FASTNERS SET FOR WBM 2958	21.00	3A
280	HPEP-Hyd	BA9789047029	PINION FOR WBM 2958	650.00	3A
281	HPEP-Hyd	BA9711322153	LOW SPEED COUPING	300.00	3A
282	HPEP-Hyd	BA9789046006	MAIN REDUCER WITH LUBE OIL SYS	5500.00	3A
283	HPEP-Hyd	16270350682-00	BASE PLATE(MAIN REDUCER)	374.00	3A
328	HPEP-Hyd	46270350886-00	SPACER(MAIN MOTOR)	3.14	3A
284	HPEP-Hyd	26270350469-00	GAURD FOR COUPLING(MAIN REDUCER TO COUNT	65.24	3A
285	HPEP-Hyd	26270350467-00	COUPLING HOUSING(MAIN REDUCER TO MAIN MO	38.70	3A
286	HPEP-Hyd	BA9711322145	HIGH SPEED COUPING	300.00	3A
287	HPEP-Hyd	BA9750053001	G. G. GREASING SYSTEM	200.00	3A
288	HPEP-Hyd	BA9710100025	BALL FEEDING ASSEMBLY	1687.00	3A

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289	HPEP-Hyd	BA9750140010	BF SHUTOFF GATE WITH ELECTRIC ACTUATOR	135.00	3A
290	HPEP-Hyd	FP9760327015	SLURRY RC.PUMP,KTPS 1X800MW,12500,18.4	12000.00	3A
291	HPEP-Hyd	FP9760327015	SLURRY RC.PUMP,KTPS 1X800MW,12500,18.4	12000.00	3A
292	HPEP-Hyd	FP9760327015	SLURRY RC.PUMP,KTPS 1X800MW,12500,18.4	12000.00	3A
293	HPEP-Hyd	FP9760327015	SLURRY RC.PUMP,KTPS 1X800MW,12500,18.4	12000.00	3A
294	HPEP-Hyd	FP9760327015	SLURRY RC.PUMP,KTPS 1X800MW,12500,18.4	12000.00	3A
295	Bhopal	xxxx	Motor-Booster Fan	18000.00	3A
296	Bhopal	xxxx	Motor-Wet Ball Mill	6850.00	3A
297	Bhopal	xxxx	Motor-Oxidation Blower	5300.00	3A
298	Bhopal	xxxx	Motor-RC Pump	6600.00	3A
299	PESD	Gypsum Dewatering System	Belt filter washing pump with motor	4000.00	3A
300	BAP	FW226	EMERGENCY QUENCH WATER TANK	14400.00	1A
301	BAP	FW227	EMERGENCY QUENCH SYSTEM	7200.00	1A
302	HPEP-Hyd	BA9789130007	MILL CIRCUIT TANK- WBM 2958	3400.00	1A
303	HPEP-Hyd	BA9789130007	MILL CIRCUIT TANK- WBM 2958	3400.00	1A
304	PESD	Gypsum Dewatering System	Belt filter washing tank	10000.00	1A
305	PESD	Gypsum Dewatering System	Primary hydro cyclone Consisting of Hydro cyclone clusters along with the Anchor bolts, nuts and washers, flanges, Accessory piping within the skid.- 2 Sets	2000.00	4A
306	PESD	Gypsum Dewatering System	Secondary hydro cyclone consisting of Hydro cyclone clusters along with the Anchor bolts, nuts and washers, flanges, Accessory piping within the skid.- 2 Sets	2000.00	4A

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307	PESD	Gypsum Dewatering System	Vacuum belt filters complete with Accessories including discharge chute, Drivers (VFD with LCP) and driving motors(IE3) with inverter panel, cloth spray nozzles, rubber belt , cloth etc.- 2 Nos	120000.00	4A
308	PESD	Gypsum Dewatering System	Vacuum receivers with Anchor bolts, nuts and washers- 2 Nos	4000.00	4A
309	PESD	Slurry Tank	Auxiliary Absorbent Tank (AAT)	75000.00	4A
310	PESD	Slurry Tank	Lime Stone Slurry Storage Tank (LSST)-2 nos	152000.00	4A
311	PESD	Slurry Tank	Secondary Hydro Cyclone Feed Storage Tank (SHCFT)	18000.00	4A
312	PESD	Slurry Tank	Waste Water Storage Tank (WWT)	32000.00	4A
313	PESD	Water Storage Tank	Process Water Storage Tank (PWT)	16000.00	4A
314	BAP	FW268	FIXING COMP FOR DUCT	68950.00	5A
315	BAP	FW295	FIXING COMP FOR GGH INSUL	36000.00	5A
316	PC-Trichy	81-318	FIX COM FOR MISCELLANEOUS PPG INSULATION	100.00	5A
317	BAP	FW267	INSULATION MATERIALS FOR DUCT	99022.63	5B
318	BAP	FW294	INSUL MATL FOR GGH	31500.00	5B
319	PC-Trichy	81-325	MINERAL WOOL MATTRESS	2000.00	5B
320	PC-Trichy	81-341	SEALING COMPOUND FOR INSL	100.00	5B
321	BAP	FW269	CLADDING SHEET FOR DUCT	22500.00	5C
322	BAP	FW296	CLADDING SHEET FOR GGH	13500.00	5C
323	PC-Trichy	81-350	ALUMINIUM CLADDING FOR INSULATION	700.00	5C
324	PC-Trichy	80-340	AUX STEAM HEADER	13000.00	6A
325	PC-Trichy	80-463	TG AUX COOLING WATER	52000.00	6A
326	PC-Trichy	80-477	SERVICE WATER PIPING	69000.00	6A
327	PC-Trichy	80-901	SUB DELIVERY VALVES FOR LIGHT UP	100.00	6A

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328	PC-Trichy	80-921	H AND S FOR LIGHT UP STEAM LINE	2000.00	6A
329	PC-Trichy	80-992	WELDING ELECTRODES-1	100.00	6A
330	HPEP-Hyd	ZC02-1044503200	COMPRESOR SUCTION PIPING	82.66	6A
331	HPEP-Hyd	ZC03-1044503200	COMPRESOR DISCHARGE PIPING	973.24	6A
332	HPEP-Hyd	TC9756447010	VENT SILENCER INLET PIPE SIZE 250NB	548.00	6A
333	HPEP-Hyd	23362100387-03	DISCHARGE SILENCER DRAIN	12.00	6A
334	HPEP-Hyd	ZC03-1044503300	COMPRESOR DISCHARGE PIPING	768.24	6A
335	HPEP-Hyd	ZC02-1044503300	COMPRESOR SUCTION PIPING	82.66	6A
336	HPEP-Hyd	TC9756444010	DUAL PLATE NRV 14"#150RF CS - FGD-AIR	145.00	6A
337	HPEP-Hyd	TC9756448016	DISCHARGE SILENCER OX BLOWER 14"150RF	1480.00	6A
338	HPEP-Hyd	23362100387-03	DISCHARGE SILENCER DRAIN	12.00	6A
339	HPEP-Hyd	AA5710004006	ISO VG 46 GRADE OIL	1260.00	6A
340	HPEP-Hyd	TC9765577010	ANNUBAR 14" 150RF, CS BODY,SS INTERNAL	40.00	6A
341	HPEP-Hyd	HY7242502730	LR ELBOWS 90DEG. CS 14"SCH 30BW	276.00	6A
342	HPEP-Hyd	HY7242511488	CS TEE 14"SCH STD/30 BW	60.00	6A
343	HPEP-Hyd	HY7246361774	WN FLANGE,CS , 14" SCH 30,#150 RF	50.00	6A
344	PESD	Gypsum Dewatering System	All Interconnected piping (slurry, air and water pipes), which includes the requisite pipe support materials, fitting's, gasket, flange materials, Bolting.	2000.00	6A
345	PESD	Gypsum Dewatering System	Valves for the entire Gypsum Dewatering System-1 Lot	2000.00	6A

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346	PESD	Gypsum Dewatering System	Expansion Joints at suction & discharge of each pump and also for other equipment wherever applicable	1000.00	6A
347	PC-Trichy	80-610	SERVICE AIR-COMP SUCT AND DIS TO RECEI	3700.00	6B
348	PC-Trichy	80-614	INST AIR COMP SUC AND DIS TO RECEIVER	3000.00	6B
349	PC-Trichy	80-478	DRINKING WATER PIPING	1300.00	6B

1.9.3 Weight Schedule for Part C- TP-09 Structure Erection

SI No	Description	UOM	Rate Schedule
1	Structure Erection	82 MT	LS
2	Cladding Sheet	877 Sq Mts	LS
3	GI Hand Rails	5 MT	LS

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VOLUME-IA PART-I CHAPTER -X

GENERAL

1.10.0.0	The scope of the work will comprise of but not limited to the following. (All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified).
1.10.1.0	a. The successful bidder shall furnish the following at PSSR-HQ, Chennai immediately after release of Letter of Intent (LOI)/Detailed LOI I. Unqualified Acceptance for LOI/Detailed LOI/ Work Order, as applicable. II. Security Deposit. III. Rs.100/- Stamp Paper for preparation of Contract Agreement.
1.10.1.1	b. The successful bidder shall furnish the proof of documents for the following at PSSR- Site. I. PF Regn No. II. Labour License No. III. Workmen Insurance Policy No.
1.10.1.2	In addition to the clause 2.8 of General Conditions of Contract (Volume-1C of Book-II), the contractor shall comply with the following:
1.10.1.3	The Contractor shall conform to the provisions of Indian Boiler Regulation, State Government Factory Laws, Indian Electricity Act and rules made there under, and any other acts of legislature relating to the work and to the regulations and bye-laws of any national or local authority and of any water, lighting and other companies and/or authorities with whose systems the plant/structure is proposed to be connected and shall before making any variations from the drawings or specifications that may be necessitated by so conforming, giving to the Purchaser/Consultant written notice, specifying the variations proposed to be made and the reason for making if any apply for instructions thereof.
1.10.1.4	For any work involving repair & maintenance underground, the Contractor shall follow the safety procedural orders/instruction issued by BHEL Site Engineer/End User. The Contractor shall ensure supervision of such jobs by

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	competent persons within the meaning of Factories Act & Rules. All persons engage on such jobs shall have to have proper training instructions as required under Factories Act & Rules.
1.10.1.5	The Contractor shall abide by the provisions of Factories Act, State Factory Rules, Employee Compensation Act, Payment of Wages Act, Contract Labour (Regulation) Act etc. and keep BHEL/End User indemnified of provision the above Acts and Rules.
1.10.2.0	BOCW Act & BOCW Welfare Cess Act 1.10.2.1 BOCW Act & BOCW Welfare Cess Act 1.10.2.1.1 The Contractor should Register their Establishment under BOCW Act 1996 read with rules 1998 by submitting Form I (Application for Registration of Establishment) and Form IV (Notice Of Commencement / Completion of Building other Construction Work) to the respective Labour Authorities i.e., a) Assistant Labour Commissioner (Central) in respect of the project premises which is under the purview of Central Govt.- NTPC, NTPL etc. b) Appropriate State authorities in respect of the project premises which is under the purview of State Govt. 1.10.2.1.2 The Contractor should comply with the provisions of BOCW Welfare Cess Act 1996 in respect of the work awarded to them by BHEL. 1.10.2.1.3 The contractor should ensure compliance regarding Registration of Building Workers as Beneficiaries, Hours of work, welfare measures and other conditions of service with particular reference to Safety and Health measures like Safety Officers, safety committee, issue of Personal protective equipments, canteen, rest room, drinking water, Toilets, ambulance, first aid centre etc. 1.10.2.1.4 The contractor irrespective of their nature of work and manpower (Civil, Mechanical, Electrical works etc) should register their establishment under BOCW Act 1996 and comply with BOCW Welfare Cess Act 1996. 1.10.2.1.5 Contractor shall make remittance of the BOCW cess as per the Act in consultation with BHEL as per the rates in force (presently 1%) BHEL shall reimburse the same upon production of

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	documentary evidence. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted. 1.10.2.1.6 Non-compliance to Provisions of the BOCW Act & BOCW Welfare Cess Act is not acceptable. In case of any non-compliance, BHEL reserves the right to withhold any sum as it deems fit. Only upon total compliance to the BOCW Act and also discharge of total payment of Cess under the BOCW Cess Act by the Contractor, BHEL shall consider refund of the Amounts
1.10.3.0	PROVIDENT FUND 1.10.3.1 The contractor is required to extend the benefit of Provident Fund to the labour employed by you in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, you are hereby required to get yourself registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to you by the Provident Fund authorities within one month from the date of issue of the letter of intent. In case you are exempted from such remittance an attested copy of authority for such exemption is to be furnished. Please note that in the event of your failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to us by the customer or paid to statutory authorities by us, such amount will be recovered from payments due to you. 1.10.3.2 The final bill amount would be released only on production of clearance certificate from PF / ESI and labour authorities as applicable
1.10.4.0	OTHER STATUTORY REQUIREMENTS 1.10.4.1 The Contractor shall submit a copy of Labour License obtained from the Licensing Officer (Form VI) u/r25 read with u/s 12 of

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	Contract Labour (R&A) Act 1970 & rules and Valid WC Insurance copy or ESI Code (if applicable) and PF code no. along with the first running bill.
1.10.4.2	The contractor shall submit monthly running bills along with the copies of monthly wages (of the preceding month) u/r78(1)(a)(1) of Contract Labour Rules, copies of monthly return of PF contribution with remittance Challans under Employees Provident Fund Act 1952 and copy of renewed WC Insurance policy or copies of monthly return of ESI contribution with Challans under ESI Act 1948 (if applicable) in respect of the workmen engaged by them.
1.10.4.3	The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of Wages. In case of “Non-compliance of Sec 21 or non-payment of wages” to the workmen before the expiry of wage period by the contractor, BHEL will reserve its right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.
1.10.4.4	The Contractor shall submit copies of Final Settlement statement of disbursal of retrenchment benefits on retrenchment of each workmen under I D Act 1948, copies of Form 6-A (Annual Return of PF Contribution) along with copies of PF Contribution Card of each member under PF Act and copies of monthly return on ESI Contribution – Form 6 under ESI Act 1948 (if applicable) to BHEL along with the Final Bill.
1.10.4.5	In case of any dispute pending before the appropriate authority under ID Act 1948, WC Act 1923 or ESI Act 1948 and PF Act 1952, BHEL reserve the right to hold such amounts from the final bills of the Contractor which will be released on submission of proof of settlement of issues from the appropriate authority under the act.
1.10.4.6	In case of any dispute prolonged / pending before the authority for the reasons not attributable to the contractor, BHEL reserves the right to release the final bill of the contractor on submission of Indemnity bond by the contractor indemnifying BHEL against any

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	claims that may arise at a later date without prejudice to the rights of BHEL.
1.10.5.0	DEPLOYMENT OF SKILLED / SEMI-SKILLED TRADESMEN The following clause is applicable in case the contract value / contract price is Rs. Five crores and above. The contractor shall, at all stages of work deploy skilled / semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute / Industrial Training. Institute / National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed / certified by State / Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled / semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs. 100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding.
1.10.6.0	OTHER GENERAL REQUIREMENTS: The scope of the work will comprise of but not limited to the following. All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.
1.10.6.1	Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account of contractor only. BHEL engineer, depending upon the availability of materials, fronts etc., will decide the sequence of erection and methodology. No claims

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	for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs in other projects or for any reason whatsoever.
1.10.6.2	Contractor has to work in close co-ordination with other erection agencies at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule / plans. Contractor shall arrange & augment the resources accordingly.
1.10.6.3	The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc. for any temporary supporting or scaffolding works or as bed for pre-assembly works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.
1.10.6.4	All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.
1.10.6.5	The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely operation of equipment installed. The contractor must have adequate quantity of tools, construction aids, equipments etc., in his possession. He must also have on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel.
1.10.6.6	The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be effected for such excess draws at the rate prescribed by manufacturing units.

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1.10.6.7	No member of the already erected structure, platform, pipes, grills, other component and auxiliaries should be cut without specific approval of BHEL engineer.
1.10.6.8	No temporary supports shall be welded on the pressure parts of piping. Welding of temporary supports, cleats, etc. on the boiler columns shall be avoided. In case of absolute necessity contractor shall take prior approval from BHEL Engineer. Further, any cutting or alternation of member of the structure of platform or other equipment shall not be done without specific prior approval of BHEL Engineer.
1.10.6.9	Contractors shall ensure that all their Staff / Employees are exposed to periodical training program conducted by qualified agencies / personnel on ISO 9001 – 2015 Standards.
1.10.6.10	Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer for other agencies, like piping, Turbine, Generator erection, Cabling, instrumentation, insulation etc., to commence their work from / on the equipments coming under this scope. Sometimes, more than one agencies may have to work in same location. Sometimes it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.
1.10.6.11	The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.
1.10.6.12	For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.
1.10.6.13	If applicable, all boiler, piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. After approval of the above drawing, Erection of pipe line to be started. Inspection fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in Volume-I Book-II) shall be paid by BHEL.
1.10.6.14	Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL.

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1.10.6.15	Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, Explosive, etc. including the load test on Hoists/Handling as required for installation of the plant and equipment and render all assistance, service required in this regard.
1.10.6.16	All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.
1.10.6.17	Contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
1.10.6.18	Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
1.10.6.19	The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
1.10.6.20	Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.
1.10.6.21	During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient, BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.
1.10.6.22	On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.
1.10.6.23	For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.
1.10.6.24	If applicable, all boiler, piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. After approval of the above drawing, Erection of pipe line to be started. Inspection

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	fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in Volume-I Book-II) shall be paid by BHEL.
1.10.6.25	Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL.
1.10.6.26	Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, Explosive, etc. including the load test on Hoists/Handling as required for installation of the plant and equipment and render all assistance, service required in this regard.
1.10.6.27	All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.
1.10.6.28	Contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
1.10.6.29	Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
1.10.6.30	The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
1.10.6.31	Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.
1.10.6.32	During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient, BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.
1.10.6.33	On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard

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	is final.
1.10.6.34	For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.
1.10.6.35	If applicable, all boiler, piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. After approval of the above drawing, Erection of pipe line to be started. Inspection fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in Volume-I Book-II) shall be paid by BHEL.
1.10.6.36	Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL.
1.10.6.37	Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, Explosive, etc. including the load test on Hoists/Handling as required for installation of the plant and equipment and render all assistance, service required in this regard.
1.10.6.38	All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.
1.10.6.39	Contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
1.10.6.40	Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
1.10.6.41	The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
1.10.7.0	Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.
1.10.7.1	During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient, BHEL will induct required

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	additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.
1.10.7.2	On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.
1.10.7.3	For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.
1.10.7.4	If applicable, all boiler, piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. After approval of the above drawing, Erection of pipe line to be started. Inspection fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in Volume-I Book-II) shall be paid by BHEL.
1.10.7.5	Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL.
1.10.7.6	Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, Explosive, etc. including the load test on Hoists/Handling as required for installation of the plant and equipment and render all assistance, service required in this regard.
1.10.8.0	All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.
1.10.8.1	Contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
1.10.8.2	Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
1.10.8.3	The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to

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	be taken outside.
1.10.8.4	Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.
1.10.9.0	During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient, BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.
1.10.9.1	On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.
1.10.9.2	For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.
1.10.9.3	If applicable, all boiler, piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. After approval of the above drawing, Erection of pipe line to be started. Inspection fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in Volume-I Book-II) shall be paid by BHEL.
1.10.9.4	Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL.
1.10.9.5	Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, Explosive, etc. including the load test on Hoists/Handling as required for installation of the plant and equipment and render all assistance, service required in this regard.
1.10.9.6	All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.

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1.10.9.7	Contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
1.10.9.8	Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
1.10.9.9	The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
1.10.9.10	Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.
1.10.9.11	During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient, BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.
1.10.9.12	On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.
1.10.10.0	UTILITY POINTS
1.10.10.1	Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N2) etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by site engineer and shall route the piping to these points as per site conditions, and shall submit as built layout with 'BILL OF MATERIAL' to BHEL for approval.
1.10.10.2	The utility points shall be located at convenient point to handle and to be terminated with brass / bronze valve with suitable connection for hose pipe.
1.10.11.0	DOCUMENTATION

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1.10.11.1	The following information shall be furnished by the bidder within two weeks of award of contract for purchaser's approval: a) Bar chart covering planned activities at site b) Detailed organization chart c) Details of T&P available with contractors with documents proofs
1.10.11.2	The following information shall be furnished by the bidder after testing and inspection: Test certificates of various tests conducted at site. All inspection and test certificates shall be signed by BHEL representative also.
1.10.12.0	RECORDS TO BE MAINTAINED AT SITE:
1.10.12.1	Record of Quantity of FREE/Chargeable items issued by BHEL must be maintained during contract execution. Also reconciliation statement to be prepared at regular intervals.
1.10.12.2	The under mentioned Records/ Log-books/ Registers applicable to be maintained. a. Hindrance Register. b. Site Order Book. c. Test Check of measurements. d. Supply and Consumption Daily Register of Cement and Steel e. Records of Test reports of Field tests. f. Records of manufacture's test certificates. g. Records of disposal of scraps generated during and after the work completion.

VOLUME-IA PART-I CHAPTER -XI

FOUNDATIONS AND GROUTING

1.11.1. The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.11.1.1 Foundation for the equipments to be erected shall be provided by BHEL / clients of BHEL. The dimensions of the foundations and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. All adjustments of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipments / plants shall be carried out by the contractor.

1.11.1.2 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., dewatering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form / shuttering work are within the scope this work.

1.11.1.3 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also minor chipping, dressing of foundations up to 30 mm for obtaining proper face for packer plates / shims, as may be required for the erection of the equipment / plants will have to be carried out by the contractor without extra cost

1.11.1.4 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments / equipments based on the foundations including shear lug provisions/openings.

1.11.1.5 Foundation pockets are to be cleaned thoroughly before placing the supports / columns / equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. If required cleaning of the threads to be done with proper dies.

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- 1.11.1.6 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment. Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc., shall also be blue matched by Prussian Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineer's instructions.
- 1.11.1.7 Total grouting of the columns / equipments including pocket grouting, grouting at the gap between foundation and base plates top surface of column / equipments is in the scope of the contractor. All the grouting should be carried out by non-shrink cement like conbextra GPI / Conbextra GP II / Shrinkkomp or its equivalent etc. This special non-shrink cement shall be arranged by the contractor at his cost. The quoted rate shall be inclusive of the same.
- 1.11.1.8 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange, a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous expenditure for this activity. BHEL will not pay any service and incidental charges for arranging the supplier representative. The contractor to take note of this aspect and quote accordingly.
- 1.11.1.9 All equipment bases and structural steel bases and foundations pockets shall be grouted and finished as per these specifications after surface preparation unless otherwise recommended by the equipment manufacturers. The surface preparation includes soda washing of the foundations to remove oil, grease etc. to ensure proper grouting.
- 1.11.1.10 The certificates of the grout are to be submitted BHEL. If necessary, test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc. to be arranged by the contractor including the fine aggregates.

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1.11.1.11 All the materials required for grouting including special cements as approved by BHEL and other materials like Portland cement, sand, chips, gravel, etc., are to be arranged by the contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.

1.11.1.12 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / sheets at site by the contractor to meet site requirement. However, machining of the packers, wherever necessary, will be arranged by BHEL at free of cost.

1.11.2 PROCEDURE FOR GROUTING:

Contractor has to carry out the grouting as per the work instructions for grouting available at site or the grouting is to be carried out as per the supplier's recommendation / IS standard. Copy of those recommendations is to be submitted to BHEL for records.

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VOLUME-IA PART-I CHAPTER- XII

ERECTION

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.12.1 Erection

- 1.12.1.1 The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision/clarification of BHEL engineer will have to be followed.
- 1.12.1.2 In case of any class of work for which there is no such specifications as laid down in the contract such as blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.
- 1.12.1.3 The temporary structures/ items welded to permanent members/pipes are to be cut and removed without any damage. Any damage so to permanent members/ pipes to be made good by the contractor at his cost.
- 1.12.1.4 All welded joints shall be subjected to acceptance by BHEL Engineer.
- 1.12.1.5 The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection /location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage/loss of such equipment at site.
- 1.12.1.6 Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.
- 1.12.1.7 Materials shall be stacked neatly, preserved and stored in the contractor's shed/work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area/site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.
- 1.12.1.8 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.
- 1.12.1.9 Contractor has to arrange required fire proof tarpaulins to protect the machined components / assembled parts drawn from BHEL before and after erection at their cost.
- 1.12.1.10 Any fixtures, scaffolding materials, approach ladders, concrete block supports, steel structures required for temporary supporting, pre assembly, checking, welding,

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- lifting & handling during pre-assembly and erection shall be arranged by the contractor at his cost.
- 1.12.1.11 In the case of structural members / ducts in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connects the joints at no extra cost.
- 1.12.1.12 Fine fittings and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.
- 1.12.1.13 Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.
- 1.12.1.14 It shall be the responsibility of the contractor to provide ladders on column for initial works till such time stairways are completed. For this the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.
- 1.12.1.15 Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing.
- 1.12.1.16 In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.
- 1.12.1.17 All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope.
- 1.12.1.18 Wherever elbows of 45 deg or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used. No extra cost shall be paid.
- 1.12.1.19 Erection of flow switches, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL/Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.
- 1.12.1.20 Contractor shall also weld small length of piping with root valve to the pressure, flow and level tapping points on piping or flow nozzles/orifices/ metering elements fixed on piping as per the instructions of BHEL Engineer.

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- 1.12.1.21 Welding of pressure and temperature instrumentation points and all other instrumentation points on piping/ducting for permanent system as well as for performance guarantee test is in the scope of work.
- 1.12.1.22 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.
- 1.12.1.23 Wherever hanger and support materials are not received from manufacturing unit in time to suit the erection schedule, contractor shall erect the system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports. The erection of temporary support is in the scope of contractor at no extra cost.
- 1.12.1.24 No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc.,
- 1.12.1.25 Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive is within the quoted / accepted rate.
- 1.12.1.26 All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints assemblies and other components as per instruction of BHEL Engineer during erection at the quoted rate.
- 1.12.1.27 Contractor shall engage separate gangs throughout the contract period, exclusively for proper housekeeping of the site. The contractor has to make necessary arrangements for collection and for bringing down the scrap from all locations and taking them away from the erection areas to various locations as indicated by BHEL Engineer. The house keeping must be a routine and continuous activity.
- 1.12.1.28 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up painting required to be done on any equipment or part during the course of erection will have to be done by the contractor.
- 1.12.1.29 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be removed / attended as per BHEL engineer.
- 1.12.1.30 Field Quality Assurance Formats: -

It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL and customer as token of their acceptance. Payment to the contractor will be linked with the submission of these FQA log sheets.

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1.12.2 ERECTION OF FGD

- 1.12.2.1 Brief list of System / sub-system to be erected by the contractor & approximate weight of individual PGMA's & items are given in this tender elsewhere and are meant for giving general idea to the tender only about magnitude of the work involved. This should not be taken for billing or any other claims. All weights for such purposes will have to be taken from design documents only (shipping list). This section also gives general idea about various components to be erected with expected accuracy level. However, the contractor is requested to get the correct details from the engineer to avoid mistakes and rework.
- 1.12.2.2 All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include
- a) Scaffolding and rigging operations
 - b) Machine / flame / electric cutting, grinding, welding, radiography and stress relieving.
 - c) Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, cleaning, checking, leveling, blue matching, aligning and assembly.
 - d) Machining, surface grinding, drilling, doweling, shaping
 - e) Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication
- 1.12.2.3 Preparation of preassembly bed is arranged wherever required for preassembly of FGD components on consolidated ground. The preassembled component should be supported to avoid sagging. No separate payment will be made.
- 1.12.2.4 Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection. (Walls with stiffeners in welded condition will be provided)
- 1.12.2.5 All the dampers, valves, lifting equipments, power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre-commissioning. The bearings of dampers shall be properly cleaned, serviced and lubricated before commissioning at no extra cost. Even after commissioning the equipments, if there are problems in the operation they have to be attended by the contractor during the tenure of the contract.

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- 1.12.2.6 In case of any class of work for which there is no such specifications as laid down in the contract such as blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.
- 1.12.2.7 Spring suspensions / constant load hangers have to be preassembled and adjusted for the required loading and erected as per instructions, of BHEL Engineer. Any adjustments, removal of temporary arrestors / lockers, etc., have to be carried out as and when required at no extra cost to BHEL.
- 1.12.2.8 The contractor shall carry out necessary preservative painting, periodic application of preservations on Rotating parts and other equipments during erection / after erection until completion of work. Necessary preservatives / paints, other consumables are to be arranged by the contractor at his cost
- 1.12.2.9 Contractor shall provide necessary crew with all items like wire brushes, paint brushes, emery paper, cotton waste, scaffolding materials etc., at his cost.
- 1.12.2.10 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain a reliable and complete pipe installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. (Any machining or threading is involved will only be done by BHEL).
- 1.12.2.11 Fabricated pipes are sent in standard length and will be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends up to NB 65 mm will have to be fabricated at site adopting specified heat treatment procedures, wherever required at no extra cost.
- 1.12.2.12 In the case of structural members / ducts in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt, connect the joints at no extra cost. Normally, the machine profile will be cut out for the structural members but the contractor will have to carry out suitable alteration / adjustments at site, without any extra payment in case it becomes necessary.
- 1.12.2.13 Erection & welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., both for regular measurements and performance testing to be provided are covered with in scope of this tender, will also be the responsibility of the contractor and the same will be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be contractor's responsibility even if, (a) Product group under

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which these items are released are not covered in the scope of this tender, (b) Items are supplied by an agency other than BHEL if they are integral to the scope envisaged under this package. Payment will be regulated as per the settled terms and conditions.

- 1.12.2.14 The contractor shall fabricate piping, install lube oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lube oil system, carry out the pressure test of oil coolers. etc.,
- 1.12.2.15 All the tubes and pipes shall be cleaned and blown with compressed air and shown to the Engineer before lifting. Bigger size pipes should be cleaned with flexible wire brush, wherever necessary. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.
- 1.12.2.16 It is the responsibility of the contractor to do the alignment, checking, etc., if necessary, repeatedly to satisfy BHEL Engineer / customer Engineers with all the necessary tools and tackles manpower, etc., without any extra cost. The alignment will be complete only when jointly certified so, by the BHEL Engineer & customer. Also the contractor should ensure that the alignment is not disturbed afterwards.
- 1.12.2.17 Fine fittings, trim piping, oil system and other small bore piping have to be routed according to site conditions and hence shall be done only in position. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.
- 1.12.2.18 Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be fabricated, assembled and erected by contractor. However, the contractor shall be paid for this work on accepted tonnage rate for erection of structure. The steel materials required for these works shall be supplied by BHEL free of cost and the contractor will have to install them to suit the requirement. Works of major nature not covered under this clause.
- 1.12.2.19 Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.
- 1.12.2.20 Certain extra lengths of various tubes/pipes and fabricated ducts are provided as erection allowance and the same have to be cut/adjusted to suit the site conditions and layouts or certain small lengths may have to be added for adjustments to suit the site conditions. For any mismatch while matching the joints in tubes, the cutting,

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adjusting, re-welding, addition spool pieces should be done by the contractor to match site conditions without any extra payment.

- 1.12.2.21 Assistance for “calibrating / testing the power cylinders / valves, gauges, instruments, etc. and setting of actuators” shall be provided by contractor within the quoted rates.
- 1.12.2.22 The contractor has to erect the Gas Gas-heater as per the drawings, procedures and as suggested by BHEL Engineer.
- 1.12.2.23 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.
- 1.12.2.24 The fans shall be checked for blade clearance and other vital tolerances. The Flow control devices in fans like IGV/Damper units shall be serviced. Necessary assistance for balancing of equipment during trial run shall be provided by the contractor.
- 1.12.2.25 Vital clearance of mill should be checked at site and adjusted if required.
- 1.12.2.26 The HT Electric motor bearings shall be blue matched at site and checked for bearing clearance. Scrapping of bearing housing, if required to any extent shall be carried out by the contractor. No extra claim for blue matching of any two surfaces will be entertained. The HT Electric motors will also be checked for air gap and adjustment of stator / rotor to magnetic center shall be carried out as part of erection.
- 1.12.2.27 The contractor shall fabricate piping, install lube oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lube oil system, carry out the hydraulic test of oil coolers. etc.,
- 1.12.2.28 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up painting required to be done on any equipment or part during the course of erection will have to be done by the contractor.
- 1.12.2.29 Contractor shall engage separate gangs throughout the contract period, exclusively for proper housekeeping of the site. The contractor has to make necessary arrangements for collection and for bringing down the scrap from, all locations and taking them away from the erection areas to various locations as indicated by BHEL Engineer. The house keeping must be a routine and continuous activity. If the contractor does not do this job satisfactorily, BHEL will arrange for the same at the cost of the contractor. Periodical payments to the contractor for the work done will be considered only if the housekeeping is certified as satisfactory by the customer.

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1.12.3 APPLICATION OF INSULATION

- 1.12.3.1 Handling at site stores / storage yard, Transportation to site of work, Application of Insulation materials and connected works for ducts etc., and binding and cladding with sheets etc., using their own tools plants, tackles, all consumables, supervisor and men as enumerated in the scope of contract. Insulation works include application of wool insulation, sheet metal cladding, welding of hooks / supports to hold insulation under this contract but are not limited to the following.
- 1.12.3.2 All insulations materials including iron components and other sheets, casing materials, etc., required as per drawing will be supplied by BHEL and the same have to be erected / applied as per the drawings and specifications of BHEL by the contractor.
- 1.12.3.3 Clean the Surface to be insulated from Rust, Dust, Grease, Loose scale, Oil, Moisture, etc. Care shall be taken that flexible insulation is not unduly compressed. After insulating the equipment, the gaps / joints shall be filled with loose wool/ molded insulation as applicable.
- 1.12.3.4 Painting of inner side of sheet metal covering over the insulation walls with two coats of anti-corrosive paint (IS-158) to be applied to the entire satisfaction of BHEL Engineer and application of bituminous sealing compound on cladding/ sheet metal joints shall also be carried out by the contractor. For which the required amount of paint, and other accessories for painting, cleaning the surfaces etc., shall be supplied by the contractor within the quoted rate.
- 1.12.3.5 Bituminous sealing compound will be provided by BHEL free of cost which is supplied by the respective Mfg. Units.
- 1.12.3.6 Wastages allowance for the materials issued are envisaged as follows:
- | | |
|---------------------|----|
| i. Wool mattresses | 2% |
| ii. Cladding sheets | 5% |

VOLUME-IA PART-I CHAPTER - XIII

WELDING, HEAT TREATMENT & RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

- 1.13.1 The equipments and piping shall be erected in conformity with the standard / specification in practice in BHEL. The method of welding (viz) Arc, TIG or other methods as indicated in the detailed drawing or as instructed by BHEL Engineer shall be followed. BHEL Engineer will have the option to change the method to suit site conditions. All the prepared / patched edges will have to be suitably protected to prevent rusting or foreign material ingress.
- 1.13.2 All welders including tack welders, structural and high pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification and performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.
- 1.13.3 All welders shall be tested and approved by BHEL Engineer before they are quality ensured on work though they may possess the requisite certificates. BHEL reserves the right to reject any welder without assigning any reason. The contractor will be responsible for the periodic renewal, retesting of the welders as demanded by BHEL statutory requirements.
- 1.13.4 BHEL Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him.
- 1.13.5 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expense. The engineer prior to any repair being made shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the quality engineer.

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- 1.13.6 Pre -heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, etc. wherever necessary are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer and as specified in Erection Welding Schedule, Welding, Heat Treatment & NDT manuals and FQP. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.
- 1.13.7 The contractor shall conduct tests like radiography dye penetrant tests, magnetic particle test etc., on weld joints, castings, and other equipments etc., as per drawing / welding schedule.

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VOLUME-IA PART-I CHAPTER - XIV

TESTING AND COMMISSIONING

The scope of the work will comprise of but not limited to the following:

1.14 TESTING, PRE – COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

- 1.14.1 The Contactor shall carry out all the required tests and pre-commissioning and commissioning activities in the FGD equipments under the scope of this contract which required for their successful and reliable operation of the system. These broadly would include Air leak test, hydraulic test, air flow test, Water fill test/ vacuum box test of tanks, trial run of pumps/ blowers/ ball mills/ feeders/ vacuum belt filter/ hydro cyclones, chemical cleaning of piping, water washing, oil flushing of oil system, etc. as per the Drgs/FQPs/manuals, etc. and as instructed by BHEL using contractors own consumables, labour and scaffoldings etc. Air leak test shall be carried out to check and rectify the various leakage and defects etc. All the chemicals required for carrying out these activities will be supplied by BHEL free of cost. Specific omission of any test which is required for the successfully commissioning of all the equipment's covered under scope does not absolve the contractor of its responsibilities of performing of that test.
- 1.14.2 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications though some of the tests / activities are not listed in these specifications.
- 1.14.3 After completion of erection of ducts and Gas Gas heaters, a test shall be performed by the contractor to establish the tightness of the erected equipment from the outlet of Forced Draught (FD) fan through the steam generator upto stack.
- 1.14.4 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall do all the repairs in the erected equipment arising out of the failure during testing.
- 1.14.5 Raw materials for all temporary piping necessary for conducting Hydraulic test, Chemical cleaning, oil Flushing, effluent disposal, etc. will be provided by BHEL free of cost. However, fabrication, servicing, erection and dismantling the same and return of the temporary piping, flanges, valves etc. to BHEL stores is the responsibility of the contractor without any extra charges.

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- 1.14.6 The scope of pre-commissioning activities covers installation of all necessary equipments including temporary piping, supports, valves, blanking, pumps, tanks, with access platforms valves, along with accessories required for hydro test, chemical cleaning, or for any other tests. The scope also covers the offsite disposal of effluents.
- 1.14.7 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. On completion, Temporary piping, pumps, valves, flanges, blanks, tanks, etc. shall be removed by him and returned to BHEL. All thermowells points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.
- 1.14.8 All items / material required for conducting the above tests will be supplied by BHEL / its customer. However, servicing, dismantling and returning of the same to stores is the responsibility of the contractor who is erecting the equipment / piping. The contractor may note that no separate payment shall be released for any temporary works that are to be carried out for conducting pre-commissioning and commissioning tests. Bidders are advised to include expenses on temporary works along with the rates being quoted by them. Broadly the work on temporary systems will be as under:
- Erection of all temporary piping including valves, tanks, effluent pumps, electrical control panel, etc. and cabling along with insulation and supports for Air leak test, chemical cleaning, & any testing required for FGD, etc. and effluent disposal are to be carried out as part of work. Contractor will be responsible for their operation and any servicing required during the pre-commissioning activities. He will also service the equipment and handover the equipment to the other agency for further erection / commissioning activities. All the pumps, motors and electrical control panels/ switch gear, valves and actuators will be furnished to the contractor after due servicing.
 - Blowers, blanks, etc. and putty, temporary fixtures & ducts required for conducting air tightness test, etc are to be installed. (Putty to be procured by the contractor).
 - Dismantling of the temporary equipment, piping and return the same to the BHEL stores is also included in the scope of work.

The above is only a broad breakup of the temporary works. The engineer at site will make final break up. His decision will be final and binding by all the parties.

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- 1.14.9 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic test and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 1.14.10 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
- 1.14.11 It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers/supervisors.
- 1.14.12 It shall be specifically noted that the employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.
- 1.14.13 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.
- 1.14.14 During commissioning, opening / closing of valves, changing of gaskets, Re-alignment of Rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price /rates shall also include all such work.
- 1.14.15 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and re-alignment are necessary, the contractor at his cost shall do the same as per Engineer's instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.
- 1.14.16 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a

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manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.

- 1.14.17 Cleaning and servicing of all the filters / strainers, in the system shall be done by the contractor within the accepted price. All types of oils and greases provided by BHEL to be filled in the main equipments as first fill and subsequent topping up's.
- 1.14.18 At the time of each inspection, the contractor shall take note of the decisions/ changes proposed by the Engineer and incorporate the same at no additional cost.
- 1.14.19 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable deaeration / venting / draining points with valves as per BHEL Engineer's instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL. Contractor shall cut steel blanks from steel provided within quoted rate. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities / scars of cutting weld filled and ground as per BHEL Engineer's instructions.
- 1.14.20 The hydraulic testing of the equipment and piping, covered under this scope of work has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing.
- 1.14.21 Transportation of oil drums from customer/ BHEL's stores, filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer / BHEL stores. Similarly, transport of chemicals, gas cylinders etc, for various pre-commissioning activities / processes mentioned in the above clauses and returning of remaining and / or the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.
- 1.14.22 Replacing / cleaning of filters, nozzles of the erected equipments, piping system etc. during pre-commissioning / commissioning stage are within the scope of work.
- 1.14.23 Laying of insulation of this temporary equipments are to be carried out by the contractor within quoted rate, and required insulation materials will be provided by BHEL. Required NDT tests in welding joints in the temporary pipe lines are to be carried out as part of work as per customer / BHEL requirement.
- 1.14.24 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces.

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- 1.14.25 Contractor may have to replace old/damaged gaskets / packing etc. for equipments and the same shall be carried out by contractor as per requirement. Materials will be given by BHEL.
- 1.14.26 In case any erection defect is detected during various tests / operations, trial runs as detailed above such as loose components, undue noises or vibration, strain on connected equipment, gas or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. The parts to be replaced shall be provided by BHEL free of cost. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.
- 1.14.27 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 1.14.28 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.
- 1.14.29 During this period though the BHEL's / Client's staff will also be associated in the work, the contractor's responsibility will be to arrange required tools, man and plants till such time the commissioned units are taken over by BHEL's client.
- 1.14.30 Contractor shall cut / open works if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning, opening of valves, changing of gaskets, attending to leakages, minor modification / rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.
- 1.14.31 For conducting gas tightness test, it may be required to erect the blowers and connecting ducts and commission the same for tightness test. It is the responsibility of the contractor to erect the blowers & dismantle once the test is over. Contractor shall carry out the work within the quoted rate and BHEL will provide blowers and dummies free of cost for conducting the test.
- 1.14.32 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programme made to achieve the schedule agreed with customer.

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- 1.14.33 After the commissioning activities, trial operations will continue up to handing over of the unit. Contractor shall provide the manpower for three months from trial operation completion or submission of final bill with material reconciliation whichever is later. It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers as per the work requirement along with supervisors including necessary consumables, tools etc., during this period. The rate quoted shall indicate all these contingencies also. The various categories of workers required for pre-commissioning, commissioning and post-commissioning activities are as follows:

- a) Pipe fitters
- b) Millwright Fitters
- c) HP& structural welders
- d) Riggers
- e) Unskilled workers
- f) Supervisors
- g) Electricians
- h) Ladders
- i) Sheet metal fabricator/fitter
- j) Any other category of workers as may be required.

Further in addition to the above, contractor has to arrange the following minimum manpower exclusively for assisting BHEL commissioning engineers during stabilization and trial operation period. This manpower will be directly controlled by BHEL commissioning engineers.

- 1. One supervisor per shift for three shifts
- 2. One fitter per shifts for three shifts
- 3. Three helpers per shift for three shifts
- 4. One electrician per shift for three shifts

It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL commissioning Engineers and hence, overtime, may be involved. The contractor 's quoted rate shall be inclusive of all these factors also.

- 1.14.34 During commissioning any improvement or rectification due to design requirement is involved and if the contractor is asked to carry out the job, they shall be paid at man-day rates. For this purpose, daily labour report indicating therein nature of work carried out, consumables used, etc. shall be maintained by contractor, and got signed by BHEL Engineer every day. It is not obligatory on the part of BHEL to get

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the works done by the contractor. They can employ any other agency if they so desire at that time.

- 1.14.35 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.
- 1.14.36 The contractor has to provide required man power assistance during pre-commissioning and commissioning checks of motor operated valves, actuators, control valves etc. without any extra charges.
- 1.14.37 D.S.L / equivalent system for hoisting equipment's are also to be erected and commissioned including load testing by the contractor within the quoted rates. Required manpower including electricians is to be arranged by the contractor for carrying out commissioning of electrical hoist and load testing of electrical hoist. Statutory inspection if any required to be arranged by the contractor. Required loads will be provided by BHEL free of cost.
- 1.14.38 Air tightness shall be performed on each pass of precipitator on completion of erection of ESP casing, hopper, inlet and outlet funnels with all internals fitted as per the approved drawings.

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VOLUME-IA PART-I CHAPTER-XV PAINTING

The scope of the work will comprise of but not limited to the following:

- 1.15.1 FINAL PAINTING
- 1.15.1 The scope of work shall also include supply and application of final painting of all the erected equipments as required and specified in painting schedules for the components of FGD including Rotating machines etc.
- 1.15.2 Required paints other consumable such as wire brush, brush etc. shall have to be arranged by the contractor at their own cost. The required manpower, other required consumables, T & P etc. shall be provided by the contractor within the quoted rate. The arrangement of primer/paint will be in contractor's scope.
- 1.15.3 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.
- 1.15.4 In the case of steel fabricated items, raw steel after fabrication has to be cleaned and subsequent painting to be carried out.
- 1.15.5 All the exposed metal parts of the equipments including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer and required number of finish coats as indicated in the Painting Specification which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL engineers for painting. Afterwards the above parts shall be finished with as per the instructions of BHEL/Customer official.
- 1.15.6 Normally Paint shall be applied by brushing as per the instruction of BHEL Engineer. It shall be ensured that brush marks are minimum. If needed and insisted either by BHEL / Customer in certain cases, spray painting has to be carried out within the Quoted rates. Spray painting gun and compressed air arrangement has to be made by the contractor himself within the Quoted rates.
- 1.15.7 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL / Customer.
- 1.15.8 Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready mix type in original sealed containers as packed by the paint manufacturer. No thinners shall be permitted. Paint manufacturer's instructions shall be followed in method of application, handling, drying time etc.,
- 1.15.9 The scope of painting includes application of colour bands, lettering the names of the systems, equipments; tag nos. of valves, marking the directions of flow and other data required by BHEL within the quoted rate.

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- 1.15.10 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated spots.
- 1.15.11 Each coat (Primer, intermediate, finish) shall have a minimum thickness of dry film thickness (DFT) in microns and the DFT of finish paint shall not be less than the specified. Necessary instrument for measuring the thickness of paint applied is to be arranged by the contractor.
- 1.15.12 Finish coat paint, no. of coat and DFT shall be as indicated in the painting specification enclosed in this tender / relevant BHEL document/ customer's specifications. The painting specification which is forming part of this tender as in TCC shall be used as guidelines to be followed.
- 1.15.13 The actual color to be applied shall be approved by the customer before starting of actual painting work.
- 1.15.14 Primer & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the BHEL / Customer approved agencies only, and the paints should be as per the customer painting specification. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities. The batch certificates of paints to be submitted to BHEL Engineer before using the same.
- 1.15.15 No paint shall be applied when the surface temp is above 55 deg. Centigrade or below 10 deg. Centigrade, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather.
- 1.15.16 Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.
- 1.15.17 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL / Customer.
- 1.15.18 Wherever applicable, supply and application of primer / final painting of all the insulation items erected under the scope of this tender. The painting shall be as required and specified in the painting schedule, which forms the part of this tender book.
- 1.15.19 Painting of inner side of sheet metal covering over the insulation walls with two coats of anti-corrosive paint (IS-158) to be applied to the entire satisfaction of BHEL Engineer and application of bituminous sealing compound on cladding/ sheet metal joints shall also be carried out by the contractor. Retainer type 'A' must be coated with Aluminium paint. For which the required amount of paint, other consumables & accessories for painting, cleaning the surfaces etc., shall be arranged by the contractor within the quoted rate.

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- 1.15.19.1 The contractor shall effectively protect the finished work from action of weather and from damage of defacement and shall cover the finished parts, then and there, for their protection.
- 1.15.20 PRESERVATION / TOUCH UP PAINTING
 - 1.15.20.1 Contractor shall carryout cleaning and preservation / touch up painting for the materials / equipments under this tender specification right from pre- assembly stage to till the equipment is cleared for final painting. The primer paint shall be matching shop primer.
 - 1.15.20.2 Any rust on the materials shall be cleaned and painted before erection of the material. Cleaning of rust and painting shall be done by the contractor within the rates awarded in the contract and no additional cost will be provided for the same.
 - 1.15.20.3 Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of same primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.
 - 1.15.20.4 Mostly the equipment / items / components will be supplied with one coat of primer paint and one coat of finish paint. However, during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final color.
 - 1.15.20.5 Required paints, other consumable such as wire brush, brush etc. shall have to be arranged by the contractor at their own cost. The required manpower, other required consumables, T & P etc. shall be provided by the contractor within the quoted rate. The arrangement of primer/paint will be in contractor's scope
 - 1.15.20.6 Painting of portions of Employer's structures wherever connection/welding is carried out by contractor for supporting structures.
 - 1.15.20.7 All rectification including painting of Employer's structure which are damaged by contractor during his work.
 - 1.15.20.8 Respective Painting scheme to be followed for the items fabricated and erected.

VOLUME-IA PART - I CHAPTER – XVI

ACCOUNTING OF MATERIALS ISSUE

(FABRICATION & ERECTION)

1.16.1 ISSUE OF STEEL

1.16.1.1 The steel shall be issued to the contractor on the following basis:

Sl. No.	Description	Basis
(a)	Structural Steel	Weighment basis (Unit – MT)

1.16.1.2 All the structural steels issued by BHEL shall be properly accounted for. The total quantity of steel required for the work will be calculated from the approved, fabrication drawings and sketched etc. The measurement for payment as well as for accounting (issue, reconciliation and return of materials) shall be based on the sectional weights as indicated in the following IS standards. No rolling tolerance shall be accepted in any case for issue, reconciliation, return of materials and payment purposes

IS: 808-1964 Beams, Channels and Angles

IS: 1730-1961 Plates, Sheets and Strips / Flats

1.16.1.3 The steel issued to the contractor shall be mainly in standard length and sections as received from the supplier. However, the contractor shall be bound to accept the steel in length as available in the project stores no claims for extra payment because of issue of non-standard length will be entertained.

1.16.1.4 The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.

1.16.1.5 The contractor shall submit to the engineer, a statement indicating estimated quantity of steel required during a quarter, at least two months in advance of the quarter. In addition, the contractor shall also furnish the estimated requirement of steel during a month by the third week of the previous month indicating his requirement.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.1.6 Following shall be limit for the maximum quantity of BHEL issue materials that would be with the contractor at any point of time when work is in progress (excluding what has already been incorporated in the works).

SL.	Issue of Materials	Maximum Quantity in contractor's store.
1	Structural Steel	Requirement of one month

Bidders to ensure that no lamination materials are taken over by them from BHEL.

Fabrication wastage, if any due to above, shall not be compensated by BHEL.

1.16.2 RETURN OF MATERIALS

- 1.16.2.1 All surplus steel and all wastage materials will be taken back on weightment basis.

- 1.16.2.2 Surplus, unused and untampered steel shall be sorted section-wise and returned separately for a place directed by BHEL/Engineer within the project area. Return of such materials will not be entitled to any handling and incidental charges.

- 1.16.2.3 All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be promptly returned to the stores and a receipt obtained for material accounting purposes. Return of such material will not be entitled to any transportation and incidental charge. Bidder shall use the scrap materials for their use in the permanent works as embedment / inserts etc. after necessary store issue formalities and site clearance.

1.16.3 SCRAP & SERVICEABLE MATERIALS:

- 1.16.3.1 All Structural steel of length above 2 M except M.S. Plate shall be considered as serviceable materials provided the materials is in good and acceptable condition. Structural steel in length less than 2 M shall be treated as scrap.

- 1.16.3.2 Plates having both sides greater than 1 M or if any side is less than 1 M but greater than 0.5 M and the total area is equal or greater than 2 Sq. M shall be considered as serviceable.

- 1.16.3.3 All pipes measuring 2 M and above in length shall be treated as serviceable materials provided they are in good and acceptable condition. Pipe in less than 2 M length shall be treated as scrap.

- 1.16.3.4 All TMT measuring 3 M and above in length shall be treated as serviceable materials provided they are in good and acceptable condition. TMT in less than 3 M length shall be treated as scrap.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.16.4 STEEL CONSUMPTION AND WASTAGE

1.16.4.1 STRUCTURAL STEEL, (ROLLED SECTION, PLATES ETC.) CONSUMPTION & WASTAGE.

a) CONSUMPTION.

The theoretical consumption of various sections shall be based on approved drawings. Weights shall be calculated considering the sectional weights as per Indian standard. No extra shall payable to the contractor for any deviation in weights for the two different procedures adopted for issue and calculation of the theoretical consumption including rolling tolerances.

i). Actual consumption = Issue – Surplus.

ii). Surplus = Untampered, unused, uncut quantity of steel and Serviceable materials as stipulated under clause “Scrap and Serviceable Materials returned by the contractor to BHEL store along with relevant documents.

iii). Wastage = Actual consumption – Theoretical consumption.

b) WASTAGE

Allowable wastage: - 8% (EIGHT percent) of the theoretical consumption shall be considered. Wastage shall be considered as cut pieces and scrap material, measured as per actual weighment basis. Invisible wastage (max limit to 0.5%), if any, shall be considered to be included in the specified 8% allowable wastage.

Sl. No.	CONSUMPTION OF STRUCTURAL STEEL (ROLLED SECTION, PLATES & SS liner)	BASIS OF ISSUE
S-1	Theoretical consumption (without Considering any wastage, scrap or loss) as per spec. & drawing.	Free
S-2	Wastage limited to plus Eight percent (+8%) of the aforesaid theoretical consumption (S-1) towards allowable wastage.	Free
S-3	Wastage beyond Eight percent (8%) of the aforesaid theoretical consumption (S-1).	Penal Rate

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.16.5 RECONCILIATION OF MATERIALS

1.16.5.1 The contractor shall submit a reconciliation statement of steel issued to him and steel procured by him with each RA Bill.

1.16.5.2 At the time of submission of bills, the contractor shall properly account for the material issued to him as specified herein to the satisfaction of BHEL certifying that the balance materials are available with contractor's custody at site.

1.16.5.3 At the time of submission of bills by the contractor, if it is noticed by BHEL that the wastage is high and calls recovery at the penal rate, then, BHEL will proceed for recovery for the excess wastage as per penal recovery rates as specified.

1.16.5.4 The reference drawings for actual material consumption to be used for the purpose of reconciliation shall be drawings prepared by the BHEL and drawings approved by BHEL for fabrication works and such other drawings approved by BHEL. This shall also include the bar bending schedule prepared by the contractor and approve by BHEL.

1.16.6 RECOVERY OF MATERIAL

If wastage exceeds the specified limit, the recovery of excess wastage shall be made from monthly Running Account Bill at the Penal Rate.

PENAL RATE OF MATERIALS

A	STRUCTURAL STEEL MS plates, MS flats, rolled steel joists, channels, and angles, MS pipes, Chequered Plates, etc in sizes and lengths as available	Rs. 72755/- per MT plus GST
---	---	-----------------------------------

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-I CHAPTER - XVII

PROGRESS OF WORK

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

- 1.17.1 Refer forms F -14 to F-18 of volume I D (Forms & Procedure) of volume -I Book-II. Plan and review will be done as per the formats.
- 1.17.2 Contractor is required to draw mutually agreed monthly erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.
- 1.17.3 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.
- 1.17.4 Tenderers have to furnish a list of Tools and Plants including cranes, Tractor / Trailers etc., which they propose to deploy for this work.
- 1.17.5 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer. The periodicity of the reports will be decided by BHEL Engineer at site.
- 1.17.6 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.
- 1.17.7 The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard.
- 1.17.8 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.
- 1.17.9 The monthly report as a booklet shall be submitted at the end of every month and shall contain the following details: -
 - a. Progress photographs in colour.
 - b. Erection progress in terms of tonnage, welding joints, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.
 - c. Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- d. Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operators and helpers. Data shall be split up under the work areas like FGD, Insulation etc.
- e. Consumables report giving consumption of all types of gases and electrodes during the previous month.
- f. Availability report of cranes.
- g. Safety implementation report in the format.
- h. Pending material and any other inputs required from BHEL for activities planned during the subsequent months

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME – IA PART-I CHAPTER-XVIII

PRESERVATION

SCOPE OF WORK FOR PRESERVATION OF MATERIALS AT STORES. IF REQUIRED

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

- 1.18.1 Contractor shall carryout cleaning and preservation / touch up painting for the materials / equipments under this tender specification, wherever deficiency in painting / rusting is noticed. The primer paint shall be matching shop primer. The required manpower, consumables, T & Ps etc. shall be provided by the contractor with in the quoted rate.
- 1.18.2 Components are received duly painted from manufacturing unit. Due to handling or deterioration due to life of paint or deterioration due to climatic / storage condition etc., paint may get peeled off or rubbed off. This needs preservation to avoid further rusting of components. Also, during this activity, the painting / repainting of W.O. No. and other relevant particulars that may need to be painted on the components is also covered with in the scope of work.
- 1.18.3 This may call for handling /re handling of materials. All required T&Ps shall be arranged by the contractor at their cost BHEL will not provide any T & P, for this scope of Work.
- 1.18.4 The contractor is expected to submit periodic reports on the preservation carried out for perusal by BHEL Engineer, in the formats as specified by BHEL Engineer.
- 1.18.5 The contractor shall be responsible for any damages of materials / components due to mishandling in his custody. All precaution shall be taken to handle components safely.
- 1.18.6 BHEL's engineer decision shall be final regarding the process of surface preparation of the area to be painted, type and nature of painting to be done on the components and also for arranging the components sequentially to suit erection requirement.
- 1.18.7 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL/ Customer.
- 1.18.8 Preservation of materials in accordance with the BHEL's preservation manual and / or as per BHEL's instruction shall be within the quoted rate.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME – IA PART-I CHAPTER-XIX

PROCEDURES RELATED TO MATERIAL HANDLING, STORAGE & OTHER RESPONSIBILITIES AT BHEL STORES

1.19.1 PROCEDURE TO BE ADOPTED BY THE CONTRACTOR IN CASE OF SHORT / DAMAGED NON DELIVERED CONSIGNMENTS DESPATCHED BY ROAD

1.19.1.1 PROCEDURE FOR NON DELIVERED CONSIGNMENTS

1.19.1.1.1 Apply for and obtain a certificate of Non-delivery from the Road carriers.

1.19.1.1.2 File a Notice of claim on the carriers sending the same to their registered office by Registered Post A.D. and forwarding a copy to their delivery office, immediately or within 6 months from the date of Lorry way Bill.

1.19.1.1.3 The following documents should be obtained and submitted to BHEL in charge at site.

I.Original and Non-delivery certificates.

II.Copy of claim notice filed on the carriers.

III.Postal acknowledgement card or reply received for the claim notice.

IV.If the package originally non-delivered is traced and offered for delivery at a later date, apply and obtain open delivery in respect of the same before clearance.

1.19.1.2 PROCEDURE FOR SHORT DELIVERY (Non delivery of a few packages in the consignment)

1.19.1.2.1 Obtain a certificate of short delivery from the Road Carriers.

1.19.1.2.2 File a notice of claim on the carriers sending the same to their Registered Office by Registered post with A.D. and forwarding a copy to their delivery office immediately or within 6 months from the date of Lorry Way Bill.

1.19.1.2.3 Documents to be submitted to BHEL Site Engineer

I.Original short delivery certificate.

II.Copy of claim notice filed on the carriers.

III.Postal acknowledgement or reply received, for the claim notice.

IV.If the package originally short delivered is traced out and offered for delivery at a later date, apply for and obtain open delivery in respect of the same before clearance

1.19.1.3 PROCEDURE FOR SHORT/DAMAGE IN PACKAGES DELIVERED FROM THE ROAD CARRIERS

1.19.1.3.1 Apply for and obtain open delivery from the road carriers.

1.19.1.3.2 If open delivery is refused.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- I. Arrange for survey at the carrier's Godown by a licensed insurance surveyor after giving notice in writing.
 - II. Take delivery under protest in writing against acknowledgement or by Registered Post with A.D.
 - III. Make necessary endorsement regarding the loss/damage on the reverse of the consignee copy of the lorry way bill before surrendering it to the carriers.
- 1.19.1.3.3 File a notice of claim on the carriers sending the same to their registered office by Registered Post with A.D. and forwarding a copy to the delivery office immediately or within 6 months from the date of lorry way bill.
- 1.19.1.3.4 Documents to be submitted to BHEL site In charge.
- I. Claim Form.
 - II. Insurance Policy / Certificate in Original (If specific document is issued).
 - III. Original open delivery certificate and report of Insurance survey if any conducted to the final destination
 - IV. Additional documents required in the event of refusal of open delivery by the carriers
 - a. Copy of notice given to the carriers advising about the survey at their Godown before clearance.
 - b. Survey report of the licensed insurance surveyor with the bill/receipt for payment of survey fee and expenses.
 - c. Copy of letter of protest extended to the carriers with the postal acknowledgement received thereto.
 - d. Photocopy of the lorry way bill with the endorsement of the discrepancies made thereon.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART-II CHAPTER-I CORRECTIONS / REVISIONS IN SPECIAL CONDITIONS OF CONTRACT, GENERAL CONDITIONS OF CONTRACT AND FORMS & PROCEDURES

SI No.: 1

Clause No. 10.5 on RA Bill Payments, in Special Conditions of Contract (SCC), Volume- IB, Book- II, is revised as under:

The payment for running bills will normally be released within 30 days of submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc., and other dues in the meanwhile.

SI No.: 2

In addition to The EARNEST MONEY DEPOSIT (EMD) clause 1.9 and The SECURITY DEPOSIT (SD) clause 1.10 published in General Conditions of Contract (Volume I Book II) following is added for FDR:

1. FDR should be Lien marked in favour of M/s BHEL.
2. Bank issuing FDR should agree to the following conditions and submit duly signed letter addressed to BHEL, confirming the following points:
 - a) There is no Lock in Period for Encashment of the Said FDR
 - b) The amount under the Said FDR would be paid to BHEL-PSSR on Demand, at any point of Time before, or upon Maturity, without any reference to the (Contractor Name).
 - c) Encashment whether premature or otherwise would not require any clearance from any other authority /Person.
 - d) FDR will be auto renewed for such period/s initially mentioned in the FDR and he intimation of Such renewal shall be sent to BHEL, PSSR and (Contractor), immediately after the renewal.
 - e) FDR will not be closed, Encashed, Changed or Discharged without the Written permission/Confirmation from M/s BHEL PSSR.
 - f) Bank to acknowledge and agree that the Lien created on the FDR shall be in Force until M/s BHEL PSSR, gives a Discharge Letter in this regard.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

VOLUME-IA PART – II CHAPTER 2 to 4 **In the next pages as below:**

CHAPTER	Details	No. of sheets
CHAPTER 2	Technical specification, Painting scheme, Drawings & Welding procedure specification	247
CHAPTER 3	T&P Charges	13
CHAPTER 4	HSE Plan For Site Operations By Subcontractor	131



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**BHEL: BAP: RANIPET
WELDING TECHNOLOGY CENTRE****PAGE
1 OF 2****QW – 482 ASME SECTION IX.
WELDING PROCEDURE SPECIFICATION (WPS)****WPS NO:** 233 **DATE:** 03.11.2020 **Supporting PQR NO:** 194**REV NO:** **DATE:****Welding process (es):** Shielded Metal Arc Welding**TYPE:** (Manual / Semi Auto / Auto): Manual**Application(s):** Components of C276 Clad Steel Plate**QW – 402 JOINTS**

Joint design: Groove, Fillet & Plug

Backing : No

Backing Material Type : --

JOINT DETAILS

Refer Production Drawing

BASE METALS (QW-403)

P.NO. Group No -- to P.NO. -- Group No -- (OR)

Specification type and grade: Clad Steel ASTM A 265
((ASTM B575 (UNS N10276) + (Carbon steel A36/IS2062))Specification type and grade: : Clad Steel ASTM A 265
((ASTM B575 (UNS N10276) + (Carbon steel A36/IS2062))

Thickness Range: Base Metal: Groove: 1.5 mm to 20 mm

Pipe Dia Range:

Fillet: Unlimited

Fillet :

FILLER METALS (QW-404)

SMAW

SMAW

Spec.No (SFA)

5.11

5.1

AWS No (Class)

E NiCrMo-4

E 7018

F. Number

43

4

A . Number

-

-

Size of Filler Metals

See Table

See Table

Weld Metal Thickness Range:

Groove:

4 mm Max.

16 mm Max.

Fillet:

All

All

Electrode – Flux (Class)

--

--

Flux Trade Name

--

--

POSITIONS (QW – 405)

Position(s) of Groove : All

Welding Progression : Vertical up

Position(s) of Fillet : All

PRE HEAT (QW– 406)

Preheat Temp Min °C: Nil & Moisture on surface to be removed

Interpass Temp Max °C : 150

Preheat Maintenance: ---

Special heating applicable: ---



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QW – 482

WPS NO: 233

Date : 03.11.2020

PAGE
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REV NO :

POSTWELD HEAT TREATMENT (QW- 407)

Temperature Range °C : NA
Time Range : NA

GAS (QW – 408) Percent Composition
Gas(es) Mixture Flow Rate
Shielding: NA
Trailing : --
Backing : --

ELECTRICAL CHARACTERISTICS (QW – 409)

Current AC or DC : See Table
Amps (Range) : See Table
Tungsten Electrode Size and Type : --
Mode of Metal Transfer for GMAW: --
Electrode Wire feed speed Range : --

Polarity : See Table
Volts (Range) : See Table

TECHNIQUE (QW-410)

String or Weave Bead : Stringer & Weave Bead (Two times the Dia. Of Electrode)
Orifice or Gas Cup Size : --
Initial and Interpass Cleaning : (Wire Brush, Chipping, Grinding,etc.)
Method of Back Gouging : Grinding
Multiple or Single Pass (Per side) : Multiple Pass
Multiple or Single Electrode : Single
Travel Speed (Range) : --

Weld Layers	Process	Filler Metal		Current		Volt Range	Travel Speed Range mm/Min.	Others (e.g. Remarks, Comments, Hot Wire Addition, Technique Torch Angle, Etc.)
		Class	Dia in mm	Type Polarity	Amp. Range			
<i>1st Side</i> Root	SMAW	E7018	3.15	DC-EP	110-140	22-26	--	--
Filler	SMAW	E7018	4.00	DC-EP	150-180	22-26	--	--
Filler	SMAW	E7018	5.00	DC-EP	200-240	22-26	--	--
<i>2nd Side</i> Root	SMAW	E NiCrMo4	2.5	DCEP	50-80	22-26	--	--
Filler	SMAW	E NiCrMo4	4.0	DCEP	100-140	22-26	--	--

**** Prior to welding, adjacent area within 40mm from edge preparation shall be free of dirt, grease or any other harmful materials to weld**

 R-10-153	BHEL: BAP : RANIPET WELDING TECHNOLOGY CENTRE		PAGE 1 OF 2																																	
QW – 482 ASME SECTION IX. WELDING PROCEDURE SPECIFICATION (WPS)																																				
WPS NO: 229 DATE: 12.09.19 Supporting PQR NO: 190 REV NO: DATE: Welding process (es): Shielded Metal Arc Welding TYPE: (Manual / Semi Auto / Auto): Manual Application(s): Components of C276 Material (Haste alloy) & IS 2062																																				
QW – 402 JOINTS Joint design : Groove ,Fillet & Plug Backing : No Backing Material Type : --		JOINT DETAILS Refer Production Drawing																																		
BASE METALS (QW-403) P.NO. 43 Group No -- to P.NO. -- Group No -- (OR) Specification type and grade: ASTM B575 (UNS N10276) Specification type and grade: IS2062 E250BR Thickness Range: Base Metal: Groove: 1.5 mm to 12 mm Fillet: Unlimited Pipe Dia Range: Fillet :																																				
<table border="1"> <tr> <td>FILLER METALS (QW-404)</td> <td>SMAW</td> <td></td> </tr> <tr> <td>Spec.No (SFA)</td> <td>5.11</td> <td></td> </tr> <tr> <td>AWS No (Class)</td> <td>E NiCrMo-4</td> <td></td> </tr> <tr> <td>F. Number</td> <td>43</td> <td></td> </tr> <tr> <td>A . Number</td> <td>-</td> <td></td> </tr> <tr> <td>Size of Filler Metals</td> <td>See Table</td> <td></td> </tr> <tr> <td>Weld Metal Thickness Range:</td> <td></td> <td></td> </tr> <tr> <td> Groove:</td> <td>12 mm Max.</td> <td></td> </tr> <tr> <td> Fillet:</td> <td>All</td> <td></td> </tr> <tr> <td>Electrode – Flux (Class)</td> <td>--</td> <td>--</td> </tr> <tr> <td>Flux Trade Name</td> <td>--</td> <td>--</td> </tr> </table>				FILLER METALS (QW-404)	SMAW		Spec.No (SFA)	5.11		AWS No (Class)	E NiCrMo-4		F. Number	43		A . Number	-		Size of Filler Metals	See Table		Weld Metal Thickness Range:			Groove:	12 mm Max.		Fillet:	All		Electrode – Flux (Class)	--	--	Flux Trade Name	--	--
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Electrode – Flux (Class)	--	--																																		
Flux Trade Name	--	--																																		
POSITIONS (QW – 405) Position(s) of Groove : 3G ,2G, 1G Welding Progression : Vertical up Position(s) of Fillet : 3F,2F,1F		PRE HEAT (QW– 406) Preheat Temp Min °C: Nil & Moisture on surface to be removed Interpass Temp Max °C : 150 Preheat Maintenance: --- Special heating applicable: ---																																		



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QW – 482

WPS NO: 229

Date : 12.09.2019

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REV NO :

POSTWELD HEAT TREATMENT (QW- 407)

Temperature Range °C : NA

Time Range : NA

GAS (QW – 408) Percent Composition

Gas(es) Mixture Flow Rate

Shielding: NA

Trailing : --

Backing : --

ELECTRICAL CHARACTERISTICS (QW – 409)

Current AC or DC : See Table

Polarity : See Table

Amps (Range) : See Table

Volts (Range) : See Table

Tungsten Electrode Size and Type : --

Mode of Metal Transfer for GMAW: --

Electrode Wire feed speed Range : --

TECHNIQUE (QW-410)

String or Weave Bead : Stringer & Weave Bead

Orifice or Gas Cup Size : --

Initial and Interpass Cleaning : (Wire Brush, Chipping, Grinding ,etc.)

Method of Back Gouging : Grinding

Oscillation : --

Contact Tube to work Distance : --

Multiple or Single Pass (Per side) : Multiple Pass

Multiple or Single Electrode : Single

Travel Speed (Range) : --

Peening : --

Others : --

Weld Layers	Process	Filler Metal		Current		Volt Range	Travel Speed Range mm/Min.	Others (e.g. Remarks, Comments, Hot Wire Addition, Technique Torch Angle, Etc.)
		Class	Dia in mm	Type Polarity	Amp. Range			
Root	SMAW	E NiCrMo-4	2.50	DC-EP	60-80	22-28	--	--
Filler	SMAW	E NiCrMo-4	3.15	DC-EP	70-90	22-28	--	--
Cap	SMAW	E NiCrMo-4	4.00	DC-EP	90-120	22-28	--	--

** Prior to welding, adjacent area within 40mm from edge preparation shall be free of dirt, grease or any other harmful materials to weld



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**BHEL: BAP : RANIPET
WELDING TECHNOLOGY CENTRE****PAGE
1 OF 2****QW – 482 ASME SECTION IX.
WELDING PROCEDURE SPECIFICATION (WPS)****WPS NO:** 228 **DATE:** 12.09.19 **Supporting PQR NO:** 189**REV NO:** **DATE:****Welding process (es):** Shielded Metal Arc Welding**TYPE:** (Manual / Semi Auto / Auto): Manual**Application(s):** Components of C276 Material (Haste alloy)**QW – 402 JOINTS**

Joint design : Groove ,Fillet & Plug

Backing : No

Backing Material Type : --

JOINT DETAILS

Refer Production Drawing

BASE METALS (QW-403)

P.NO. 43 Group No -- to P.NO. 43 Group No -- (OR)

Specification type and grade: ASTM B575 (UNS N10276)

Specification type and grade: ASTM B575 (UNS N10276)

Thickness Range: Base Metal: Groove: 1.5 mm to 12 mm

Pipe Dia Range:

Fillet: Unlimited

Fillet :

FILLER METALS (QW-404)

SMAW

Spec.No (SFA)

5.11

AWS No (Class)

E NiCrMo-4

F. Number

43

A . Number

-

Size of Filler Metals

See Table

Weld Metal Thickness Range:

Groove:

12 mm Max.

Fillet:

All

Electrode – Flux (Class)

--

--

Flux Trade Name

--

--

POSITIONS (QW – 405)

Position(s) of Groove : 3G ,2G, 1G

Welding Progression : Vertical up

Position(s) of Fillet : 3F,2F,1F

PRE HEAT (QW– 406)

Preheat Temp Min °C: Nil & Moisture on surface to be removed

Interpass Temp Max °C : 150

Preheat Maintenance: ---

Special heating applicable: ---



R-10-153

QW – 482

WPS NO: 228

Date : 12.09.2019

PAGE
2 OF 2

REV NO :

POSTWELD HEAT TREATMENT (QW- 407)

Temperature Range °C : NA

Time Range : NA

GAS (QW – 408) Percent Composition

Gas(es) Mixture Flow Rate

Shielding: NA

Trailing : --

Backing : --

ELECTRICAL CHARACTERISTICS (QW – 409)

Current AC or DC : See Table

Polarity : See Table

Amps (Range) : See Table

Volts (Range) : See Table

Tungsten Electrode Size and Type : --

Mode of Metal Transfer for GMAW: --

Electrode Wire feed speed Range : --

TECHNIQUE (QW-410)

String or Weave Bead : Stringer & Weave Bead

Orifice or Gas Cup Size : --

Initial and Interpass Cleaning : (Wire Brush, Chipping, Grinding ,etc.)

Method of Back Gouging : Grinding

Oscillation : --

Contact Tube to work Distance : --

Multiple or Single Pass (Per side) : Multiple Pass

Multiple or Single Electrode : Single

Travel Speed (Range) : --

Peening : --

Others : --

Weld Layers	Process	Filler Metal		Current		Volt Range	Travel Speed Range mm/Min.	Others (e.g. Remarks, Comments, Hot Wire Addition, Technique Torch Angle, Etc.)
		Class	Dia in mm	Type Polarity	Amp. Range			
Root	SMAW	E NiCrMo-4	2.50	DC-EP	60-80	22-28	--	--
Filler	SMAW	E NiCrMo-4	3.15	DC-EP	70-90	22-28	--	--
Cap	SMAW	E NiCrMo-4	4.00	DC-EP	90-120	22-28	--	--

** Prior to welding, adjacent area within 40mm from edge preparation shall be free of dirt, grease or any other harmful materials to weld

DHARAT HEAVY ELECTRICALS LIMITED/NEEP HARDWAR

GW-482 WELDING PROCEDURE SPECIFICATION (WPS) BY WELDING TECHN

Company Name : DHARAT HEAVY ELECTRICALS LIMITED

Welding Procedure Specification No. T. 110145 Date : 20.1.93.

Supporting PQR No. Revision No. date :

Welding Process : GTAW Type (s) :

JOINT (GW-402)

Joint Design : Overlaying / Groove DETAILS
filling

Baking : Yes.

Baking Material : Base Material (Titanium)

Metals : Non fusing metal : Non metallics : Other :

BASE METAL (GW-403)

P. No. 5 / Group No.

Fig. No. 5 / Group No.

Specification type and grade :

to specification type and grade :

Chemical analysis and mechanical properties : As above
to chemical analysis and mechanical properties : As above

Thickness range :

Base metal Any Groove : x Fillet : all

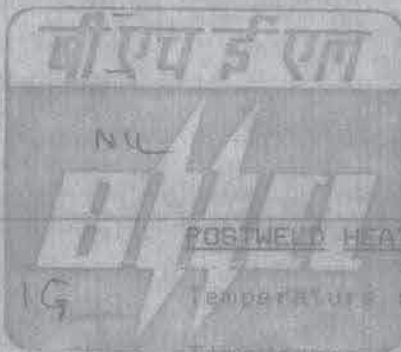
Pipe Dia range Groove : as applicable Fillet : all

Other : Nil

WPS 00-11054

FILLER METAL (QW-404)

Spec. Nos. (BFA) S. 16
 AWS No. (Class) E. v. Ti-1
 F. No. 5
 A. No.
 Size of filler metal $\phi 2.00 \text{ mm}$
 Deposited weld metal
 Thickness range 3-8 mm
 Groove -
 Fillet -
 Electrode Flux class -
 Flux trade name
 Consumable insert
 Other

POSITION (QW-405)

Position Groove : 1G
 Welding Progression : -
 Position of fillet : -

POSTWELD HEAT TREATMENT (QW-407)

Temperature range : NIL
 Time range : NIL

PREHEAT (QW-406)

Preheat temp. (min) : NIL

GAS (QW-408)

		Percentage composition		
		Gas Mixture	Flow-rate	
			l/min.	
Interpass temp. (max.) : 100°C	Shielding	Argon	-	15-20 ltr/min
Preheat maintenance : Nil	Backing	Argon	-	20-25 ltr/min
	Trailing	-	-	-

ELECTRICAL CHARACTERISTICS (GN-409)

Current AC or DC : DC Polarity : SP
 Amps range : 110-150 Amp Volts Range : 12-18 Volts
 Tungsten Electrode type or size : $\phi 3.15$ mm
 Mode of metal transfer for GMAW : NR
 Electrode wire feed speed range : NR

TECHNIQUE (GN-410)

Stringer or weave bead : String
 Orifice or gas cup size : 8 mm ID
 Initial interpass cleaning : Grinding
 Method of back gouging : NR
 Contact tube to work distance : 3 mm
 Multipass or single pass : Multipass / Continuous
 Multiple or single electrode : Single
 Travel feed speed : NR
 Peening : NR
 Electrode spacing : NR
 Other : NR

Weld Layers	Process	Filler metal Class	metal dia.	Current type amp	Volt	Speed mm/min
-------------	---------	--------------------	------------	------------------	------	--------------

GTAW C-16 $\phi 3.0$ SP 110-150 A 12-18 V -
 (Ref. 200)

SI No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
52	Lime stone slurry storage tank, Auxiliary absorber tank, Filtrate tank, Wastage water tank, Lime Tank, Hydro cyclone waste water tank, Process Water tank, Neutralization Tank Outside surfaces	FW 742	Blast cleaning to Sa 2½ (Near white metal) with surface profile 35-50µm	Primer Coat: One coat of epoxy based Zinc phosphate primer to IS 13238; DFT- 100µm Intermediate Coat: One coat of Epoxy based MIO pigmented intermediate coat; DFT- 100µm	100 100	Finish coat: One coat of Epoxy based finish coat to IS 14209; DFT- 75µm + One coat of Aliphatic acrylic polyurethane paint to IS 13213; Shade no: 631 of IS 5	75 25	300
53	Lime stone slurry storage tank, Auxiliary absorber tank, Filtrate tank, Wastage water tank, Lime Tank, Hydro cyclone waste water tank, Process Water tank, Neutralization Tank Inside surfaces	FW 742	Blast cleaning to Sa 2½ (Near white metal) with surface profile 35-50µm	Primer: One coat of Red Oxide Zinc phosphate primer to IS 12744; DFT- 30µm as liner is envisaged in the inside surfaces of tanks	30	--	--	30
54	Water pumps and accessories	FW 702	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coat) DFT- 30µm/coat	60	Two coats of Synthetic Enamel to IS 2932 DFT- 20µm/coat Shade: Sky Blue Shade no. 101 of IS:5	40	100


 CHIEF ENGINEER
 Thermal Projects Con
 TSGENCO, Vidyut
 Khairatabad, Hyderabad

FABRICATION DRAWINGS FOR AUXILIARY ABSORBENT STORAGE TANK

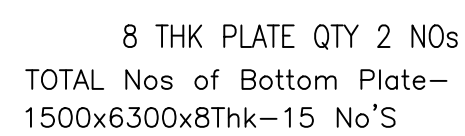
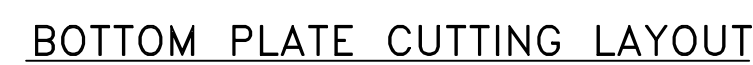
FOR TENDER PURPOSE ONLY

LIST OF DRAWINGS:

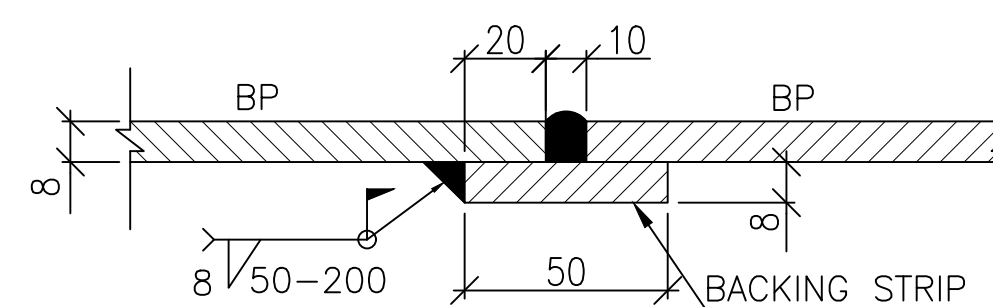
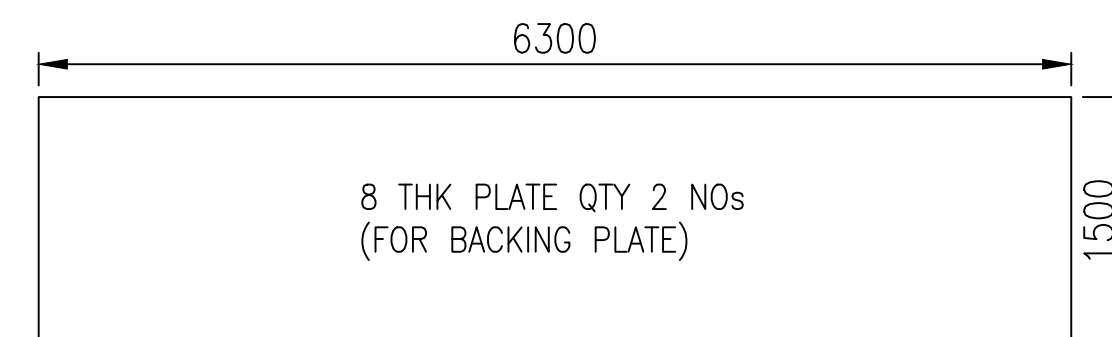
1. BOTTOM PLATE CUTTING LAYOUT
2. SHELL PLATE CUTTING LAYOUT
3. ROOF PLATE CUTTING LAYOUT
4. CORNER PLATE DETAIL DRAWING
5. STAIRCASE DETAIL DRAWING
6. NOZZLE DETAIL DRAWING
7. ROOF STRUCTURE DETAIL DRAWING

00	17.05.23	INITIAL SUBMISSION																											
REV	DATE	DESCRIPTION																											
PROJECT		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)																											
CUSTOMER		 TELANGANA STATE POWER GENERATION CO.LTD.																											
CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS, VASHI, NAVI MUMBAI.																											
ADDITIONAL INFORMATION		 BHARAT HEAVY ELECTRICALS LTD. PE & SD HYDERABAD <table border="1"> <thead> <tr> <th></th> <th>NAME</th> <th>SIGN.</th> <th>DATE</th> <th>NO.OF VAR.</th> </tr> </thead> <tbody> <tr> <td>DRN.</td> <td>RATISH KUMAR</td> <td></td> <td>17.05.23</td> <td rowspan="3"></td> </tr> <tr> <td>CHD.</td> <td>R.MURALIDHAR</td> <td></td> <td>17.05.23</td> </tr> <tr> <td>APPD.</td> <td>M.S.S.NAGESH</td> <td></td> <td>17.05.23</td> </tr> </tbody> </table>											NAME	SIGN.	DATE	NO.OF VAR.	DRN.	RATISH KUMAR		17.05.23		CHD.	R.MURALIDHAR		17.05.23	APPD.	M.S.S.NAGESH		17.05.23
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STATUS OF DRAWING																													
DISTRIBUTION OF PRINTS																													
MANUFACTURER:		<table border="1"> <tr> <td>DEPT.</td> <td>PESD</td> <td>UNTOL. DIM. GR.</td> <td></td> <td>SCALE</td> <td>WEIGHT (KG)</td> <td>REF. TO ASSY DRG.</td> <td>ITEM NO.</td> <td>NO.OF ITEMS</td> </tr> <tr> <td>CODE</td> <td>450</td> <td>e/M/F</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										DEPT.	PESD	UNTOL. DIM. GR.		SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS	CODE	450	e/M/F						
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CODE	450	e/M/F																											
CUSTOMER PACKAGE CODE		FPS		TITLE: FABRICATION DRAWINGS FOR AUXILIARY ABSORBENT STORAGE TANK						DOCUMENT NO PYDH1M162840601		REV. 00																	
DISCIPLINE																													
<table border="1"> <tr> <td>M</td> <td>C</td> <td>E</td> <td>I</td> <td>L</td> </tr> <tr> <td>☒</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> </tr> </table>		M	C	E	I	L	☒	☐	☐	☐	☐			SHT No. 01						NO OF SHT. 01									
M	C	E	I	L																									
☒	☐	☐	☐	☐																									

INVENTORY NO	SIGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
			13810105833-S01-R00



TOTAL Nos of Backing Plate-
1500x6300x8Thk-02 No'S



SECTION Y-Y

NET QUANTITY REQUIRED FOR ONE TANK (BOTTOM)						
S.NO	ITEM	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	BP1	PLATE	IS 2062 Gr E250 B	1500x6300x8Thk	5	2967
2	BP2	PLATE	IS 2062 Gr E250 B	1500x3105x8Thk	2	585
3	BP3	PLATE	IS 2062 Gr E250 B	1500x4897x8Thk	2	923
4	BP4	PLATE	IS 2062 Gr E250 B	1500x1311x8Thk	2	247
5	BP5	PLATE	IS 2062 Gr E250 B	1500x2728x8Thk	2	514
6	BP6	PLATE	IS 2062 Gr E250 B	1500x3795x8Thk	2	715
7	BP7	PLATE	IS 2062 Gr E250 B	1500x6300x8Thk	2	1187
8	BP8	PLATE	IS 2062 Gr E250 B	992x4029x8Thk	2	502
9	BP9	PLATE	IS 2062 Gr E250 B	992x2841x8Thk	2	354
TOTAL NET WEIGHT						7994

NOTES:	
1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	PLATE QTY. SHOWN FOR ONE TANK ONLY
4	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING SPEC.
5	ANY MINOR DIMENSIONAL MARKING SHALL BE ADJUSTED AT SITE.
6	ALL THE JOINTS FOR BOTTOM PLATE ARE LAP JOINTS

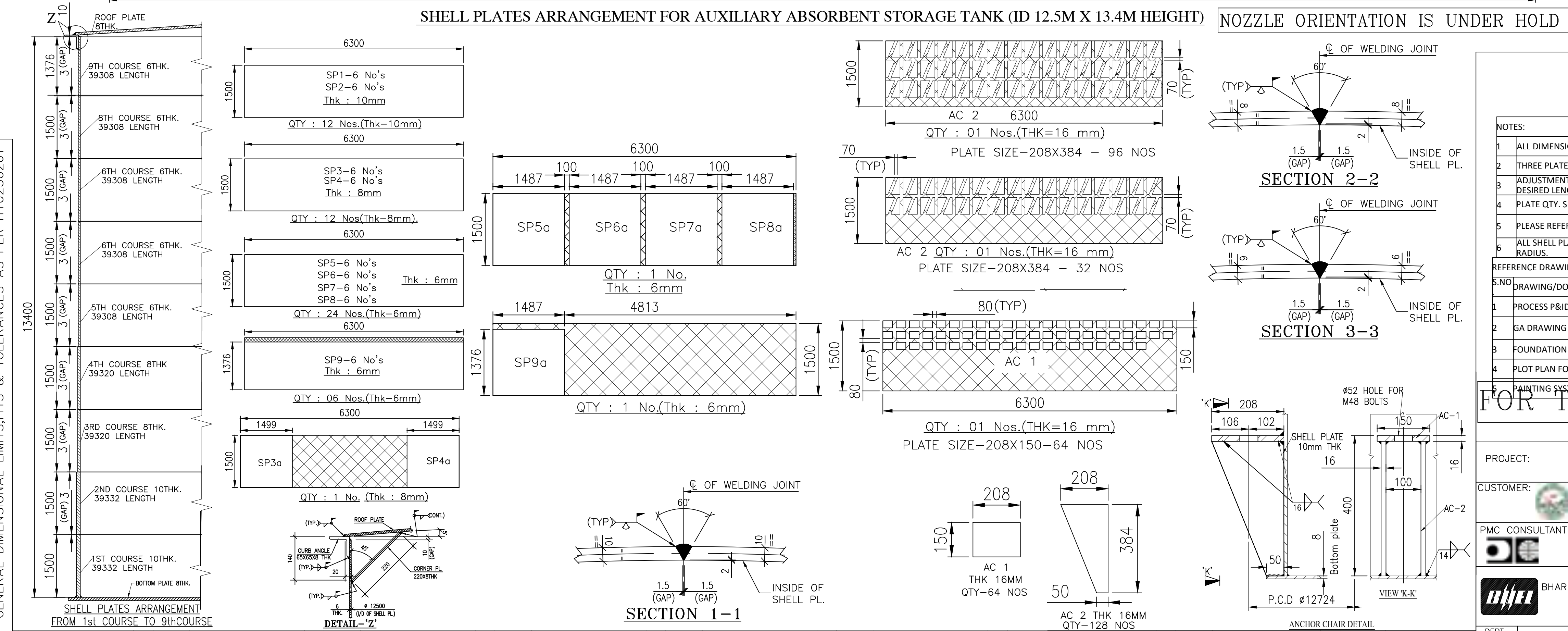
REFERENCE DRAWINGS	
S.NO.	DRAWING/DOCUMENT
1	PROCESS P&ID AUXILIARY ABSORBENT TANK
2	GA DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
3	FOUNDATION INPUT DETAIL DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)
CUSTOMER:	 TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD			NAME DRN. R.MURALIDHAR CHD. K.N.B.REDDY APPD. M.S.S NAGESH		SIGN.  		DATE 07.10.21 07.10.21 07.10.21		NO.OF VAR. N.A. N.A.				
DEPT. PE&SD CODE 410		UNTOL. DIMS. GR Ø/M/F				SCALE NTS		WEIGHT (KG) —N.A.—		REF. TO ASSY. DRG. —N.A.—		ITEM NO. —N.A.—		NO.OF ITEMS	
TITLE BOTTOM PLATE CUTTING LAYOUT DRAWING OF AUXILIARY ABSORBENT STORAGE TANK								CARD CODE		DRAWING NO. PYDH1M102844101				REV. 00	
								SHT. NO. 1		NO. OF SHT. 1					

REF. DRG. NO.	COMPUTER FILE NAME 13810105833-S01-R00
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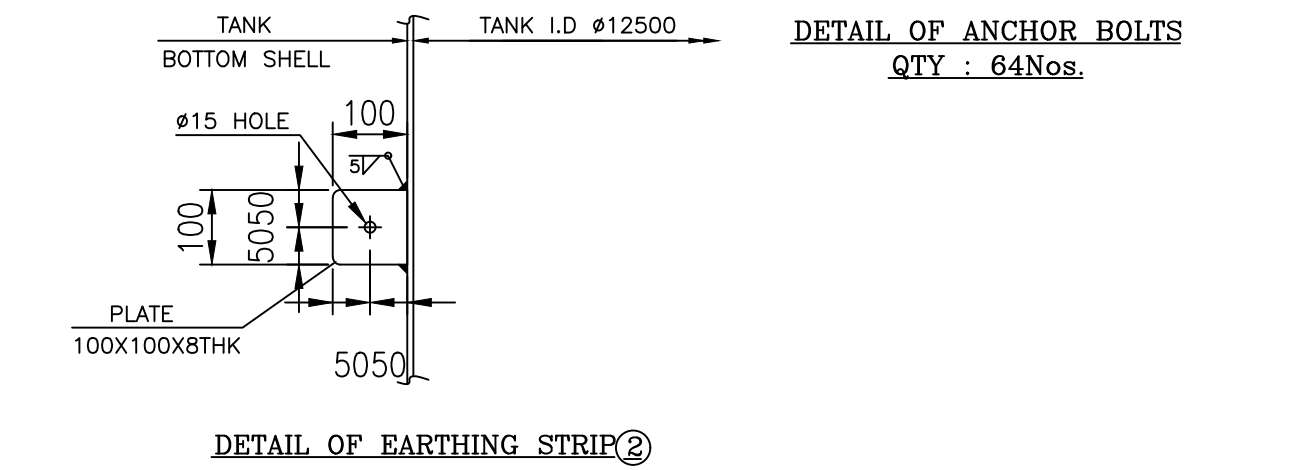
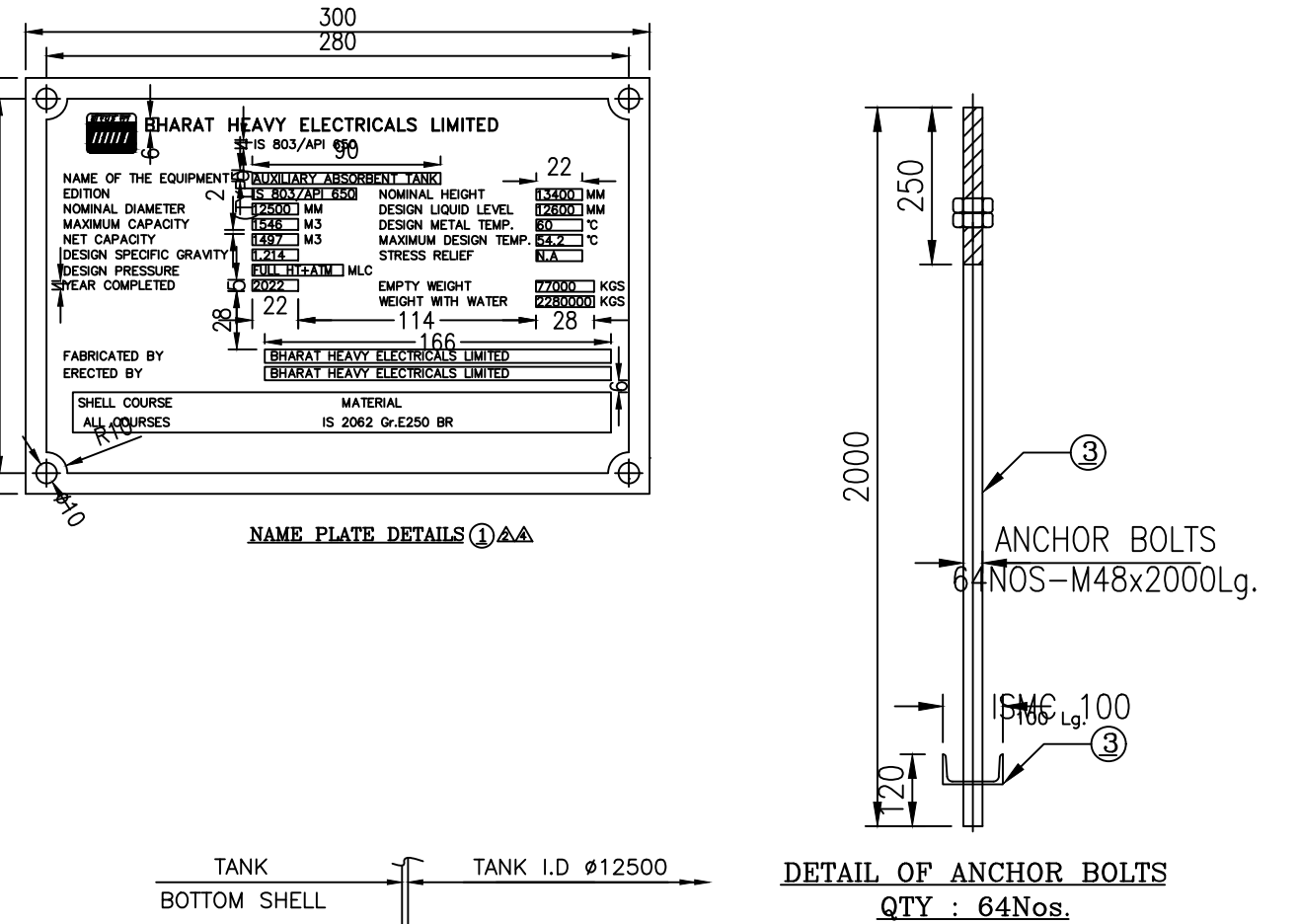
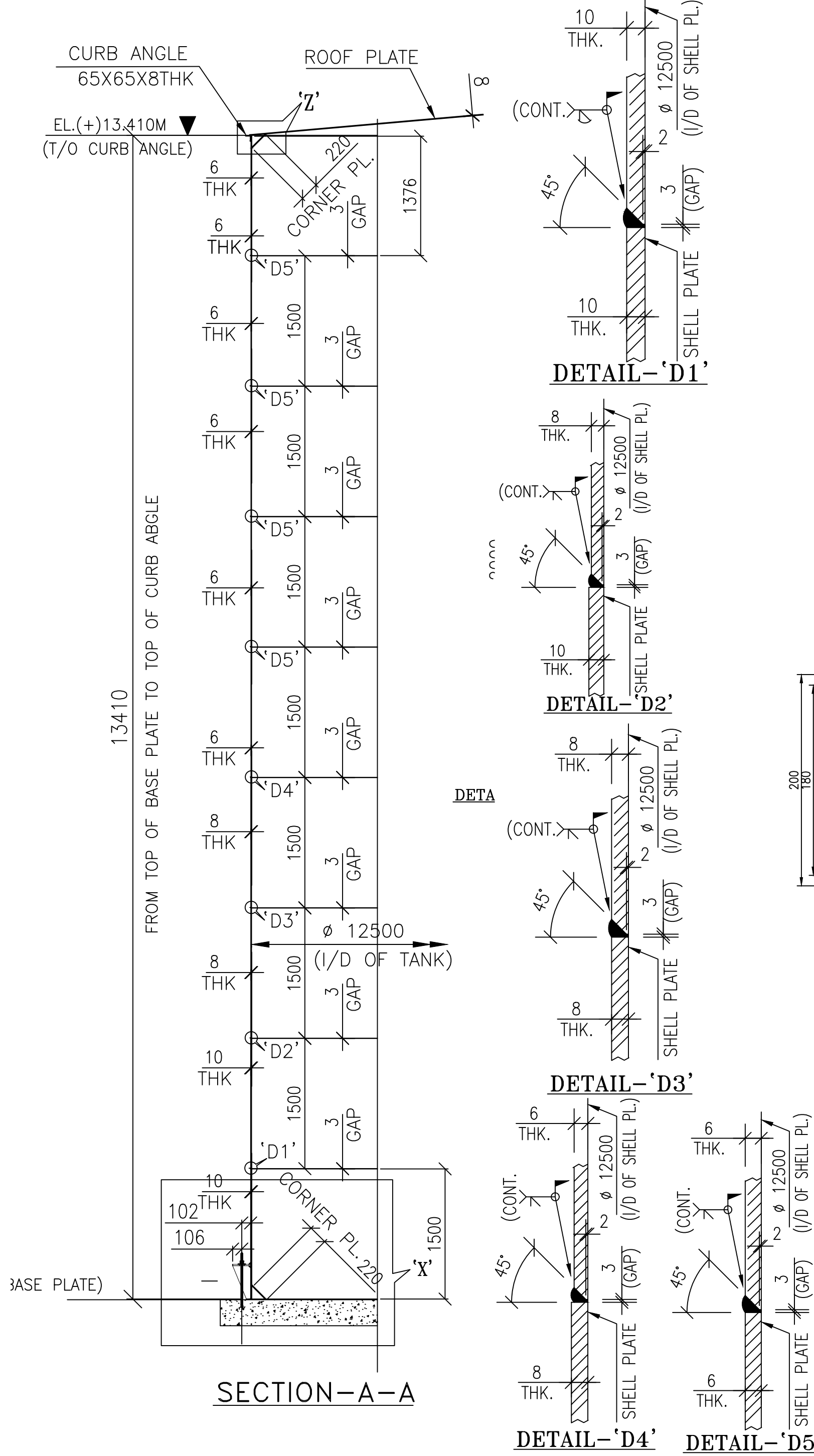
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AS ARE IN MM UNLESS OTHERWISE SPECIFIED.
INTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
HALL BE DONE ON THE LAST SPOOL PIECE, IF REQUIRED TO MAINTAIN TOTAL
H.
OWN FOR ONE TANK ONLY.
WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING.
ES, CURB ANGLE & REINFORCEMENT PLATES SHALL BE BENT TO TANK OUTER
S
MENT
AUXILIARY ABSORBENT TANK
AUXILIARY ABSORBENT STORAGE TANK
PUT DETAIL DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
RGD SYSTEM

NOTES:	
1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	ADJUSTMENT SHALL BE DONE ON THE LAST SPOOL PIECE, IF REQUIRED TO MAINTAIN TOTAL DESIRED LENGTH.
4	PLATE QTY. SHOWN FOR ONE TANK ONLY.
5	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING.
6	ALL SHELL PLATES, CURB ANGLE & REINFORCEMENT PLATES SHALL BE BENT TO TANK OUTER RADIUS.
REFERENCE DRAWINGS	
S.NO	DRAWING/DOCUMENT
1	PROCESS P&ID AUXILIARY ABSORBENT TANK
2	GA DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
3	FOUNDATION INPUT DETAIL DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
4	PLOT PLAN FOR FGD SYSTEM

PAINTING SYSTEM, FOR FGD SYSTEM									
FOR TENDER PURPOSE ONLY									
PROJECT:		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)							
CUSTOMER:		 TELANGANA STATE POWER GENERATION CO.LTD.							
PMC CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI							
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN.	NAME	SIGN.	DATE	NO.OF VAR.			
		APP.	R.MURALIDHAR		07.10.21				
		CHD.	K.N.B.REDDY		07.10.21	-N.A.-			
			M.S.S. NAGESH		07.10.21	-N.A.-			
DEPT. PL&SD CODE 450	UNTOL. DIMS. GR. Ø/M/F		SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-	NO.OF ITEMS -N.A.-		
TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF AUXILIARY ABSORBENT STORAGE TANK				CARD CODE	DRAWING NO. PYDH1M02844101		REV. 00		
				SHT. No 1		NO. OF SHT. 1			

INVENTORY NO	SIGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
			13810105833-S01-R00

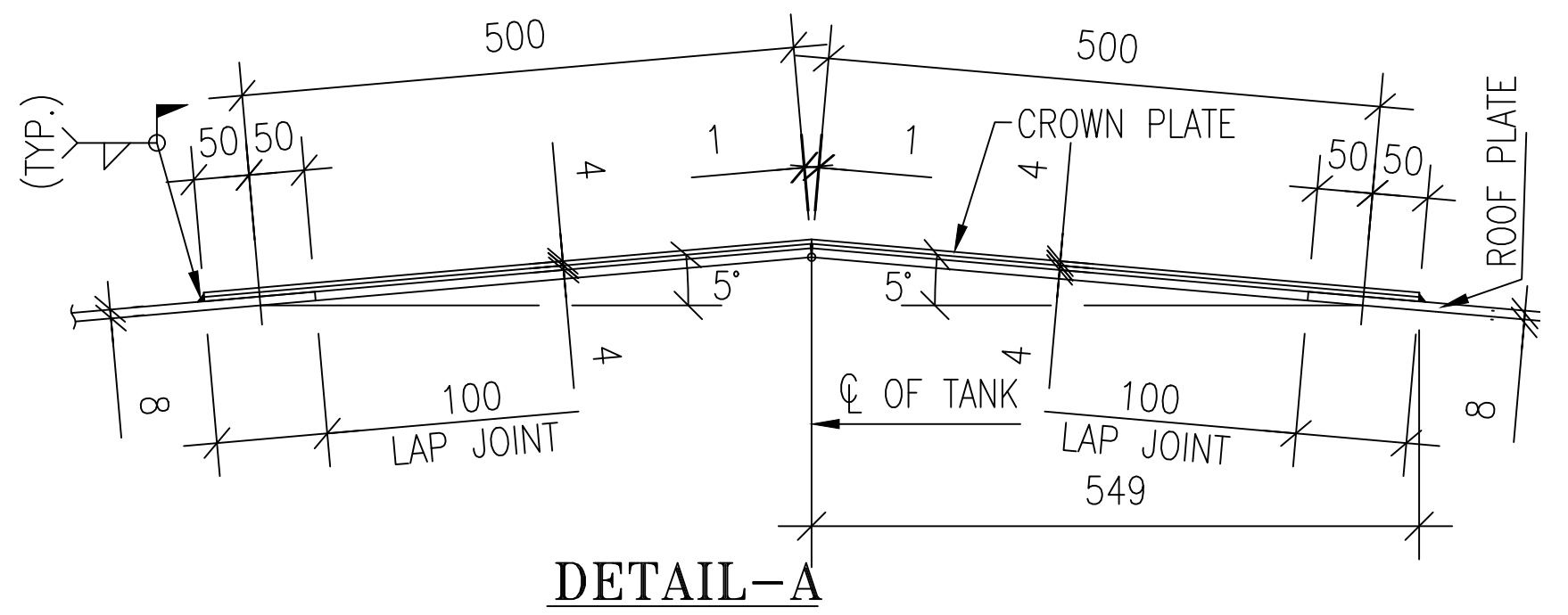
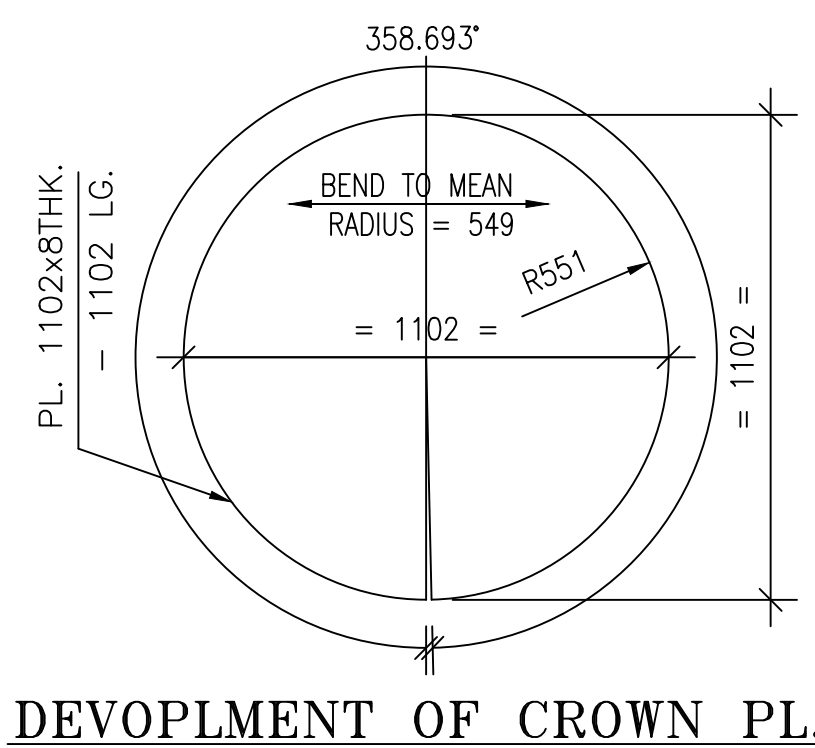
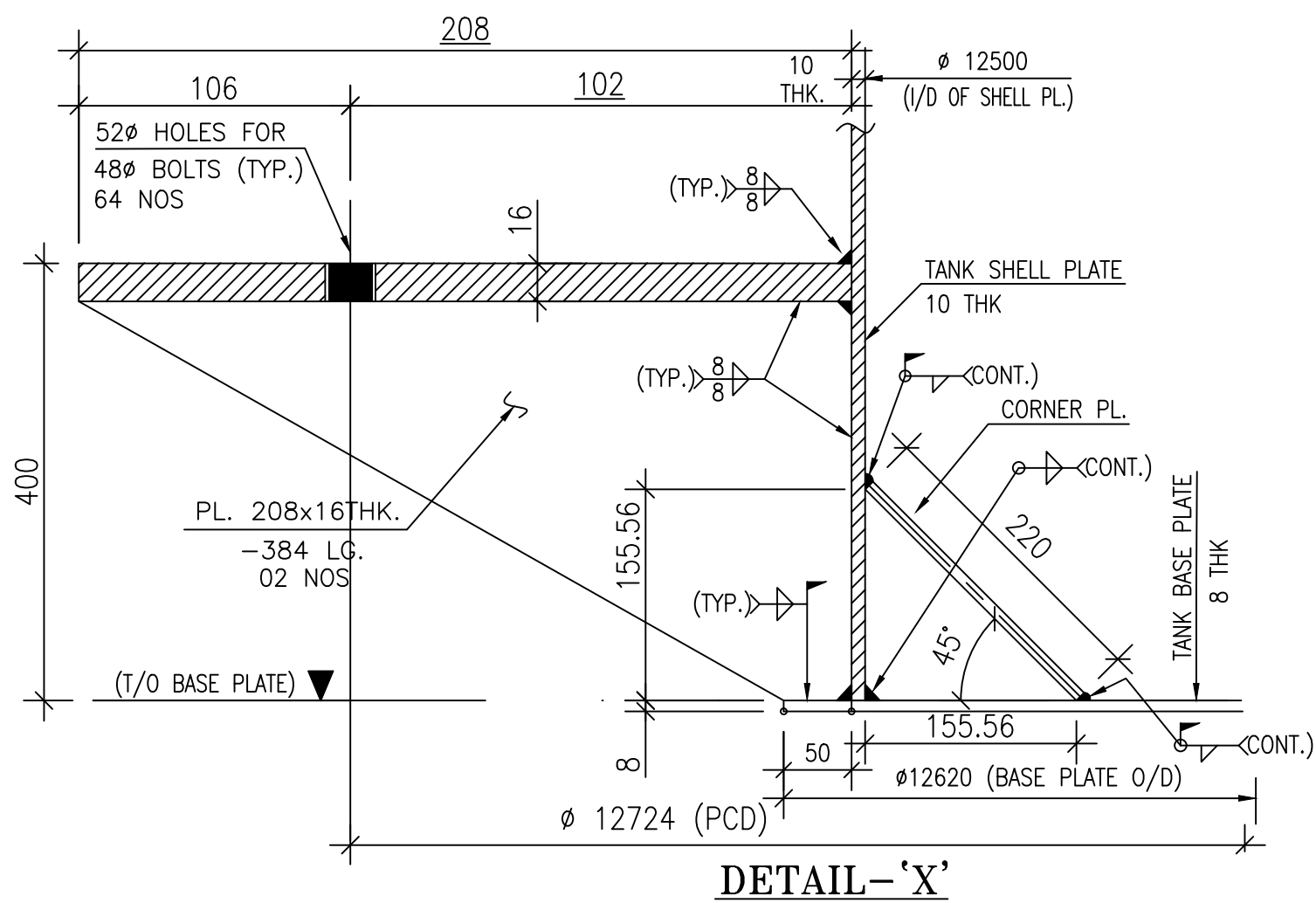


NOZZLE ORIENTATION IS UNDER HOLD

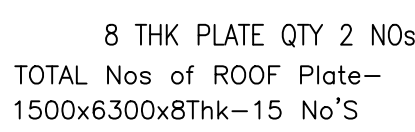
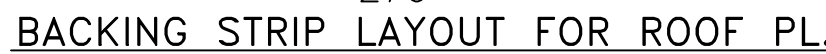
FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUEDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)
CUSTOMER:	 TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

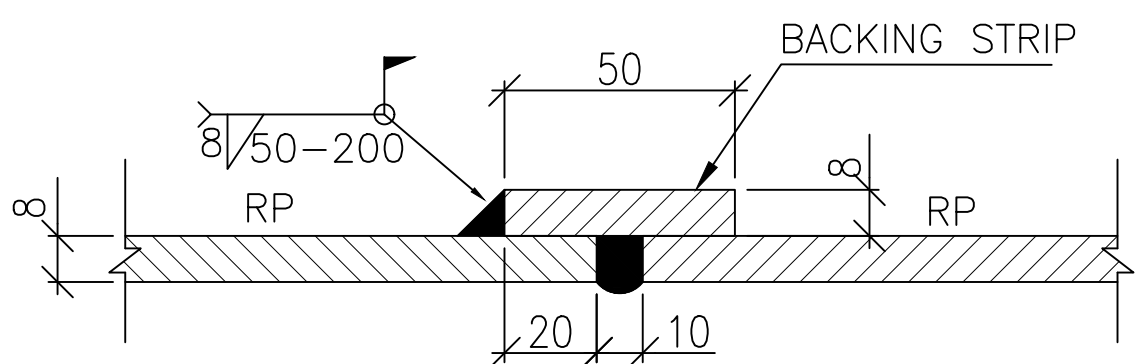
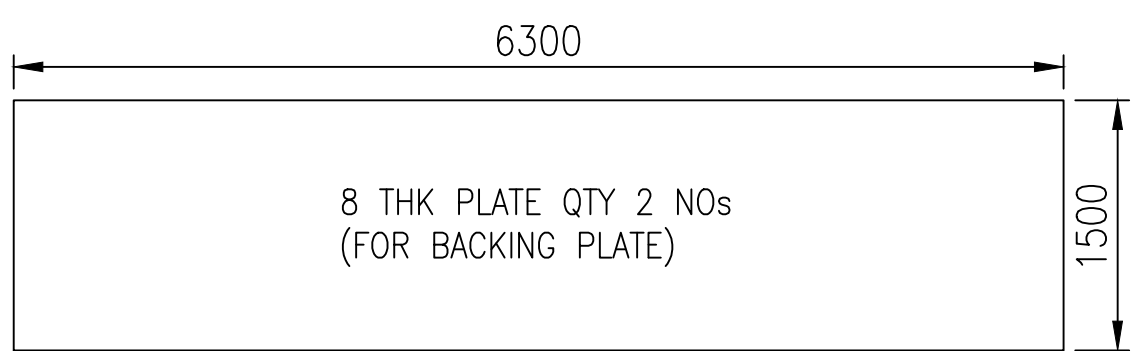
	BHARAT HEAVY ELECTRICALS LTD.				NAME		SIGN.		DATE		NO. OF			
	HYDERABAD				DRN.		R.MURALIDHAR				07.10.21		VAR.	
					CHD.		K.N.B.REDDY				07.10.21		-N.A.-	
					APPD.		M.S.S. NAGESH				07.10.21			
DEPT. HEADS CODE 450	UNTL. DIMS. GR Q/M/F		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.				ITEM NO.		NO. OF ITEMS			
			NTS	-N.A.-	-N.A.-				-N.A.-		-N.A.-			
TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF AUXILIARY ABSORBENT STORAGE TANK					CARD CODE PDYH1M02844101	DRAWING NO.				REV.				
						00				00				
						SHT. No 1		NO. OF SHT. 1						



REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APPD			CHD/APPD			02 CHD/APPD			01 CHD/APPD
ZONE			ZONE			ZONE			ZONE		
					▽						



Backing Plate BOM		
Backing Plate Sr. no	Size	Qty
1	6285x50x8THK	2
2	6220x50x8THK	2
3	6284X50x8THK	2
4	5482X50x8THK	2
5	5081x50x8THK	2
6	5031x50x8THK	2
7	5473x50x8THK	2
8	1444x50x8THK	2
9	1460x50x8THK	12
10	959x50x8THK	2



SECTION Y-Y

NET QUANTITY REQUIRED FOR ONE TANK (ROOF PLATE)						
S.NO	ITEM	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	RP1 & RP1A	PLATE	S 2062 Gr E250 B1	1500x6300x8Thk	5	2967
2	RP2	PLATE	S 2062 Gr E250 B1	1500x3090x8Thk	2	582
3	RP3	PLATE	S 2062 Gr E250 B1	1500x4882x8Thk	2	920
4	RP4	PLATE	S 2062 Gr E250 B1	1500x1296x8Thk	2	244
5	RP5	PLATE	S 2062 Gr E250 B1	1500x2711x8Thk	2	511
6	RP6	PLATE	S 2062 Gr E250 B1	1500x3776x8Thk	2	711
7	RP7	PLATE	S 2062 Gr E250 B1	1500x6281x8Thk	2	1183
8	RP8	PLATE	S 2062 Gr E250 B9	77x4001x8Thk	2	491
9	RP9	PLATE	S 2062 Gr E250 B9	77x2813x8Thk	2	345
TOTAL NET WEIGHT						7955

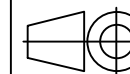
GROSS QUANTITY REQUIRED FOR ONE TANK (ROOF PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	S 2062 Gr E250 B	1500x6300x8THK	15	8902
TOTAL GROSS WEIGHT					8902

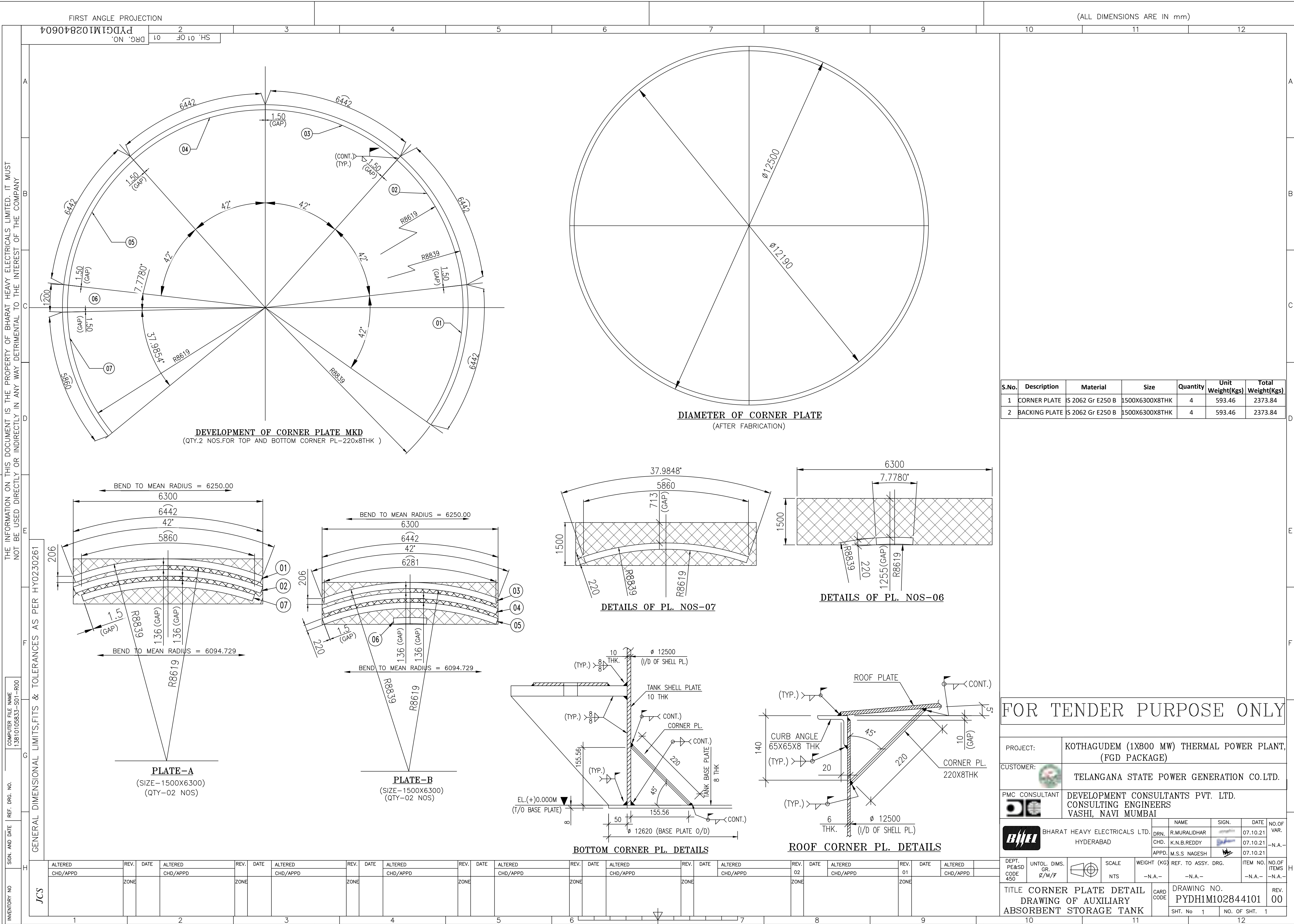
NOTES:

	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
	ADJUSTMENT SHALL BE DONE ON THE LAST SPOOL PIECE, IF REQUIRED TO MAINTAIN TOTAL DESIRED LENGTH.
	PLATE QTY. SHOWN FOR ONE TANK ONLY.
	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING.

REFERENCE DRAWINGS	
S.NO	DRAWING/DOCUMENT
1	PROCESS P&ID AUXILIARY ABSORBENT TANK
2	GA DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
3	FOUNDATION INPUT DETAIL DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

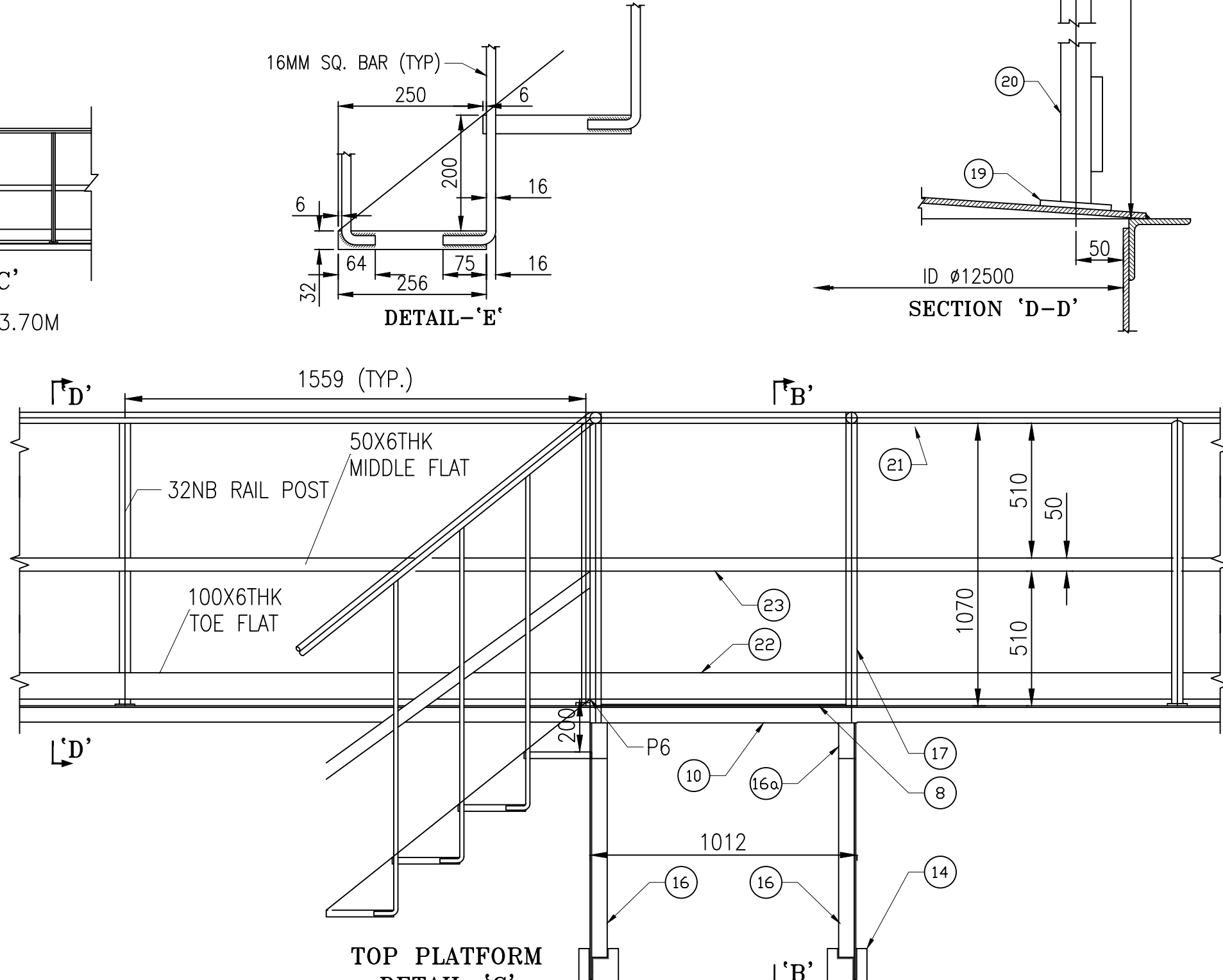
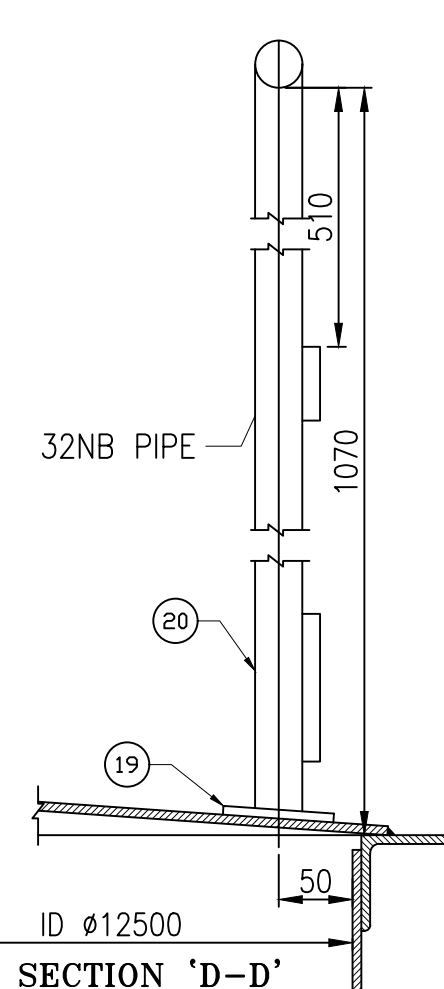
FOR TENDER PURPOSE ONLY

PROJECT:		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)									
CUSTOMER:		 TELANGANA STATE POWER GENERATION CO.LTD.									
PMC CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI									
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN.	NAME	SIGN.	DATE	NO.OF VAR.					
		CHD.	K.N.B.REDDY		07.10.21						
		APPD.	M.S.S. NAGESH		07.10.21	-N.A.-					
DEPT. & ASD CODE 450	UNTOL. DIMS. GR. 2/M/F		SCALE NTS	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS				
				-N.A.-	-N.A.-	-N.A.-	-N.A.-				
TITLE ROOF PLATE CUTTING LAYOUT DRAWING OF AUXILIARY ABSORBENT STORAGE TANK				CARD CODE	DRAWING NO. PYDH1M02844101				REV. 00		
				SHT. No	1	NO. OF SHT.		1			



SGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
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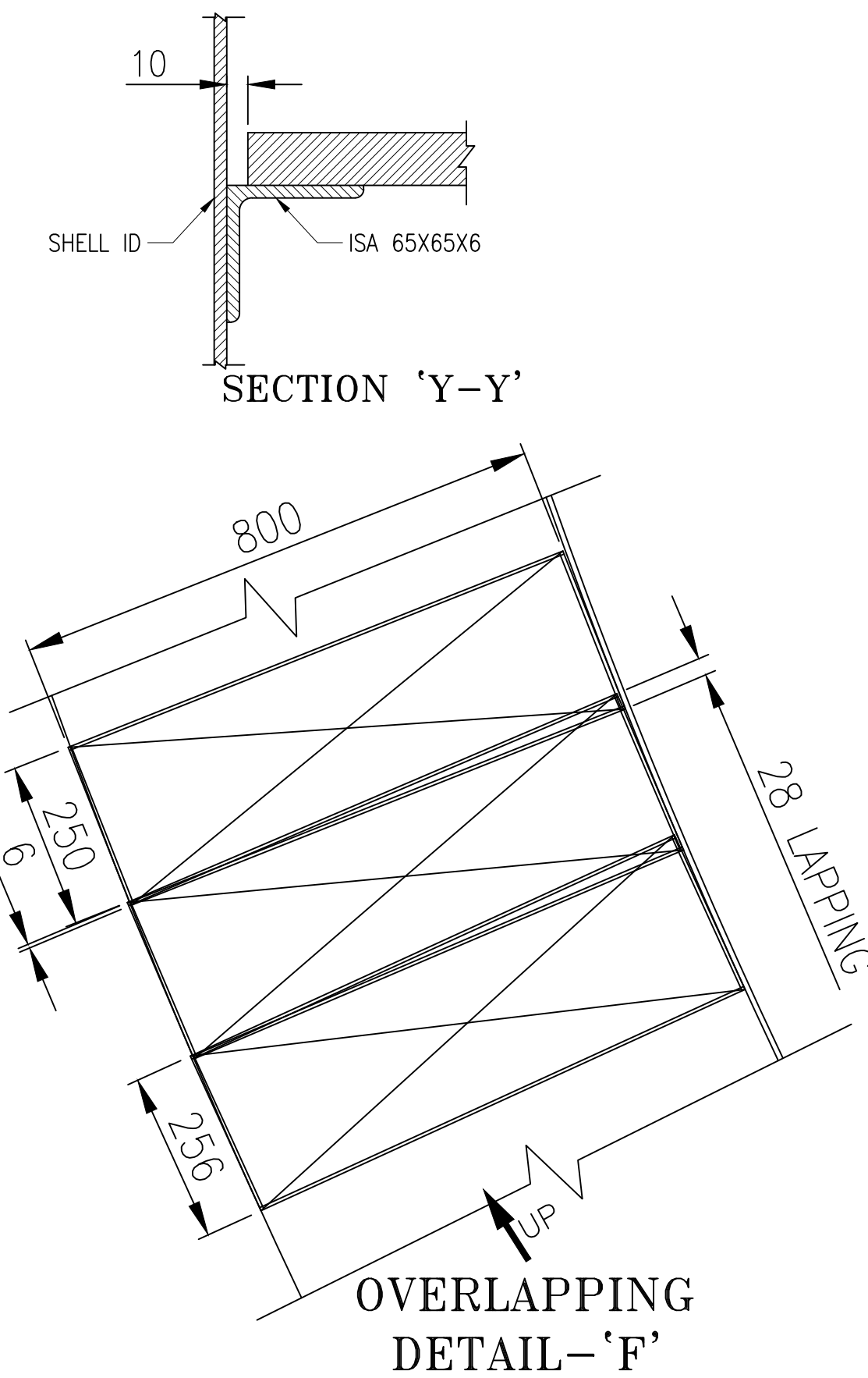
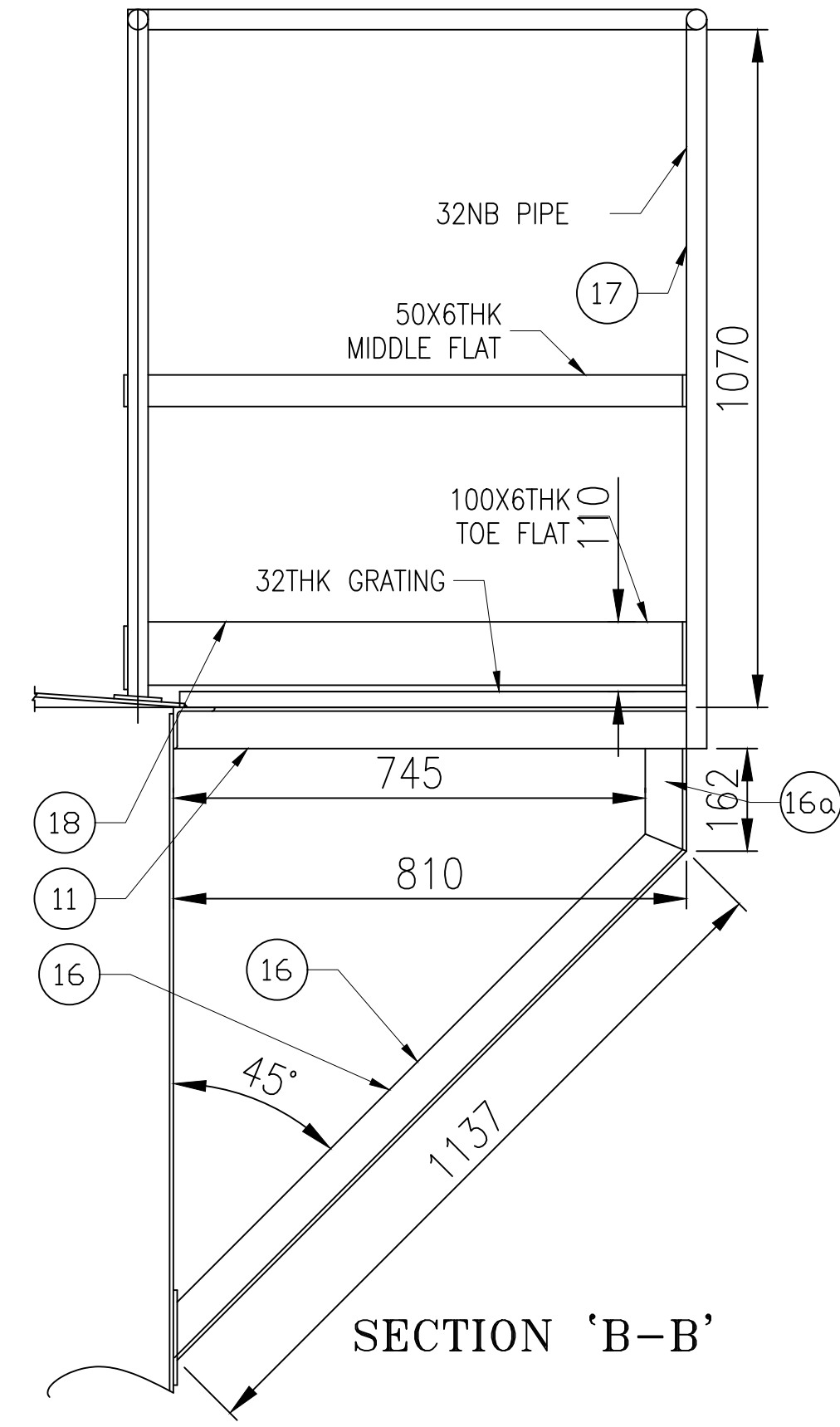
108



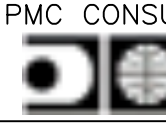
	BHARAT HEAVY ELECTRICALS LTD.			NAME		SIGN.	DATE	NO. OF
	HYDERABAD			DRN.	R.MURALIDHAR		07.10.21	VAF
				CHD.	K.N.B.REDDY			-N.A.
				APPD.	M.S.S. NAGESH		07.10.21	
DEPT. PE&SD CODE 450	UNTOL. DIMS. GR. 2/M/F		SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-		ITEM NO. -N.A.-	NO. OF ITEM -N.A.-
TITLE STAIRCASE DETAIL DRAWING OF AUXILIARY ABSORBENT STORAGE TANK				CARD CODE	DRAWING NO. PYDH1M102844101		REV 00	
				SHT. NO	1	NO. OF SHT.	1	

[illegible]

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261



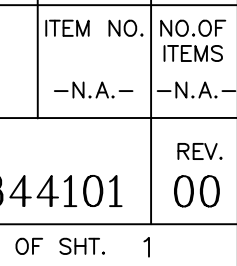
FOR TENDER PURPOSE ONLY

PROJECT: KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (PGD PACKAGE)									
CUSTOMER:		 TELANGANA STATE POWER GENERATION CO.LTD.							
PMC CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI							
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN.	NAME		SIGN.	DATE	NO.OF VAR.		
		CHD.	R.MURALIDHAR			07.10.21			
		APPD.	K.N.S.REDDY			07.10.21	-N.A.-		
			M.S.S NAGESH			07.10.21			
DEPT. PE&SD CODE 450	UNTL. DIMS. GR. 2/M/7		SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-	NO.OF ITEMS -N.A.-		
TITLE STAIRCASE DETAIL DRAWING OF AUXILIARY ABSORBENT STORAGE TANK				CARD CODE	DRAWING NO. PYDH1M02844101			REV. 00	
				SHT. No 1	NO. OF SHT. 1				

LIMITS, FITS & TOLERANCES AS PER HY0230261

AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
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108



Gr. E-50 BK	CD 15.5 x D 65 x 87mm	3	88.89	266.6
Gr. E-50 BK	45 PPR DRAWING	3	109.28	309.8
Gr. E-50 BK	88.95 x 12.75 x 3.25	3	0	0.0

TITLE	NOZZLE DETAIL DRAWING	CARD CODE	DRAWING NO.	REV.
AUXILIARY ABSORBENT STORAGE TANK		PYDH1M102844101	00	
SHT. No	1	NO. OF SHT.	1	

RELEASED FOR ERECTION

TITLE NOZZLE DETAIL DRAWING AUXILIARY ABSORBENT STORAGE TANK	CARD CODE	DRAWING NO. PYDH1M102844101		REV. 00
		SHT. No 1	NO. OF SHT. 1	

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INVENTORY NO. _____

DATE _____

REF. DRG. NO. _____

COMPUTER FILE NAME _____

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

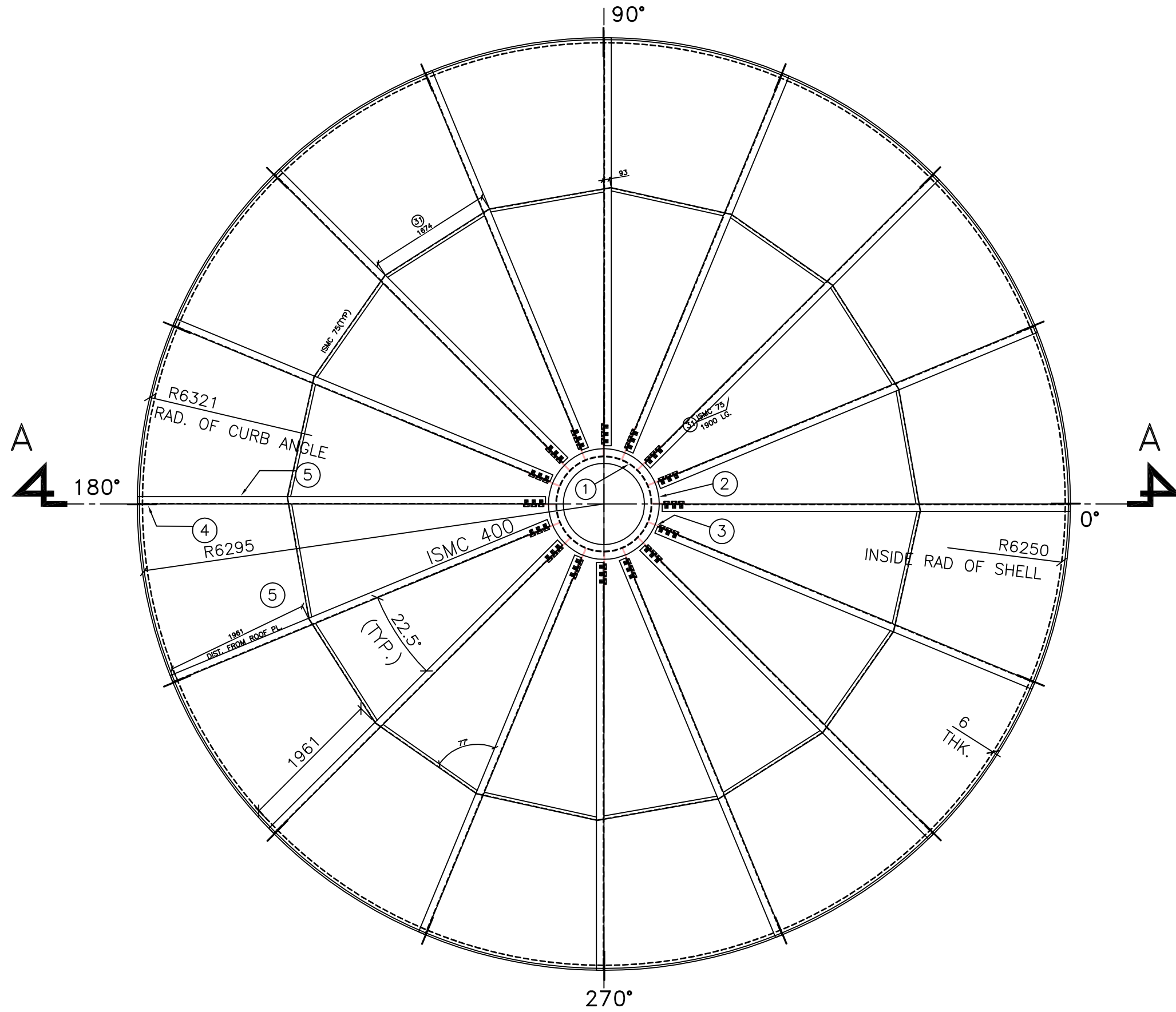
JCS

FIRST ANGLE PROJECTION

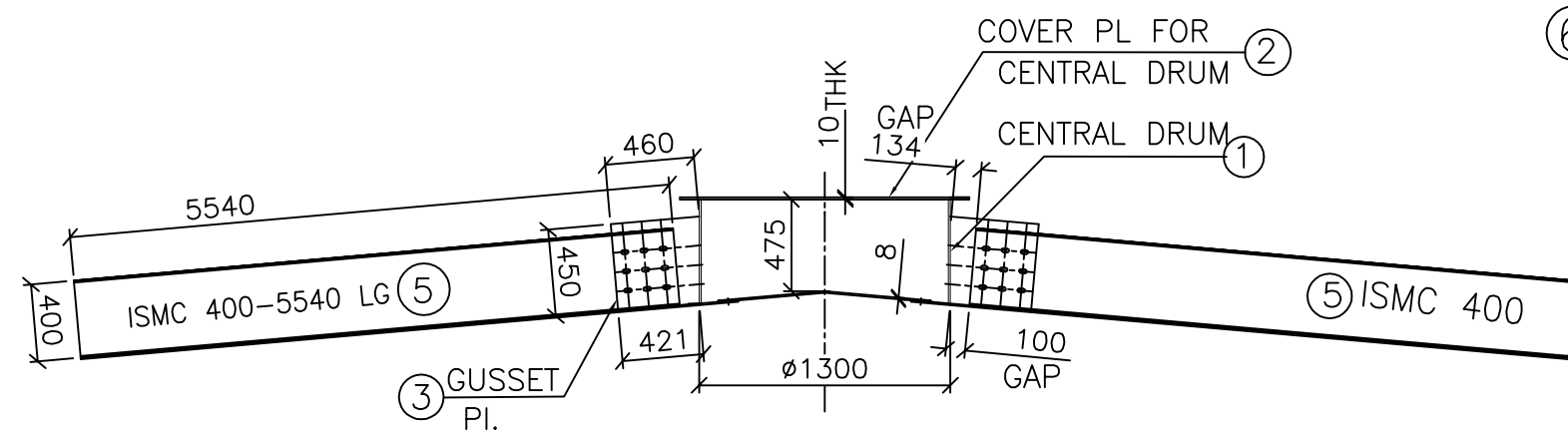
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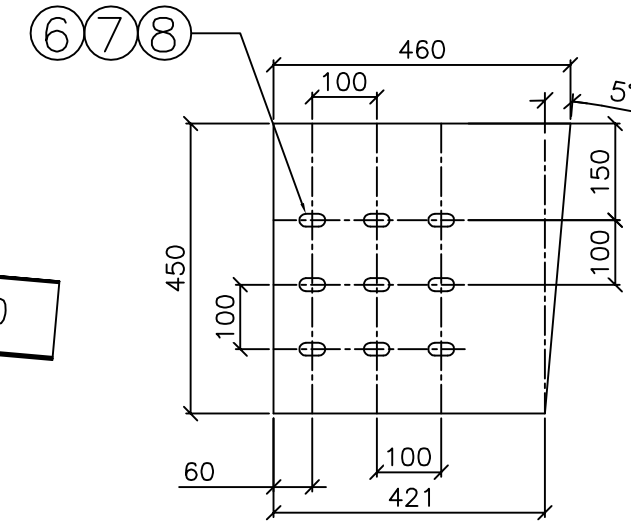
SH. 01 OF 01



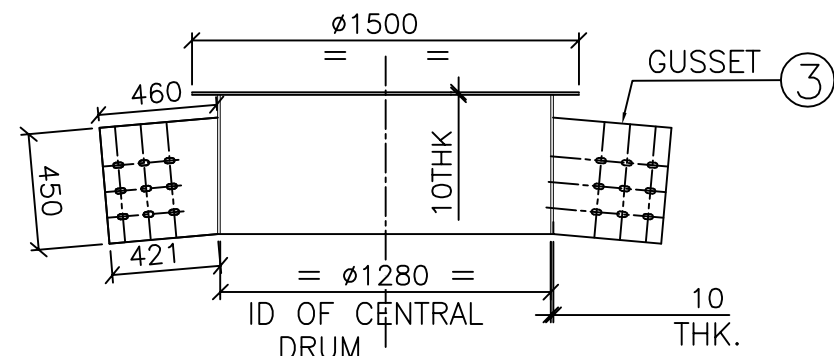
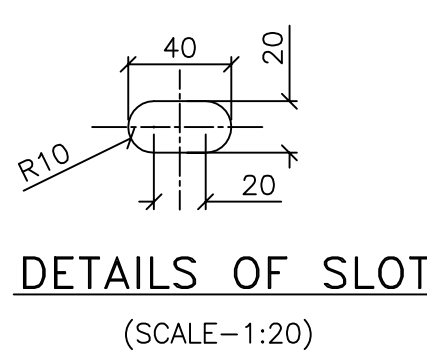
KEY PLAN OF ROOF STRUCTURE ARRANGEMENT



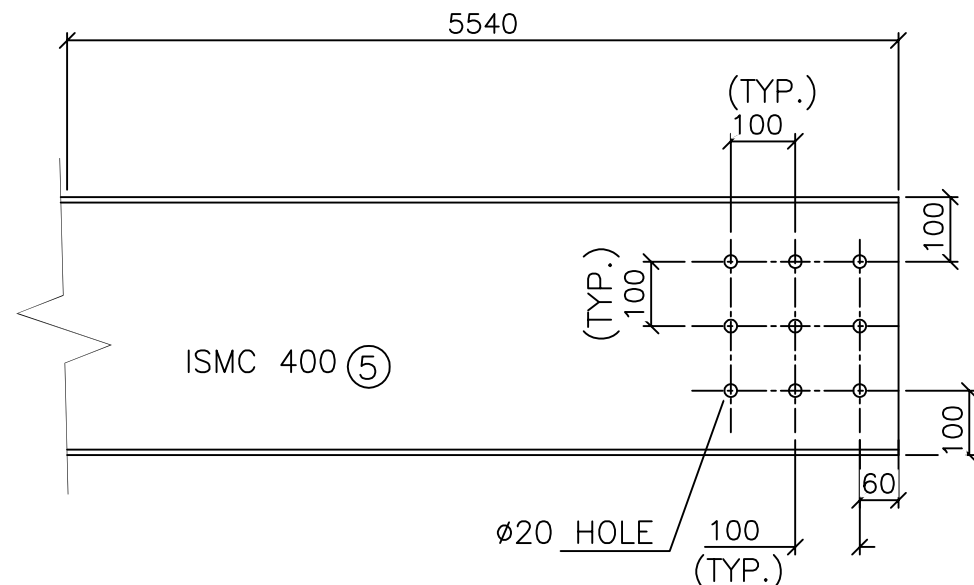
DETAIL-C (SCALE-1:1.5)



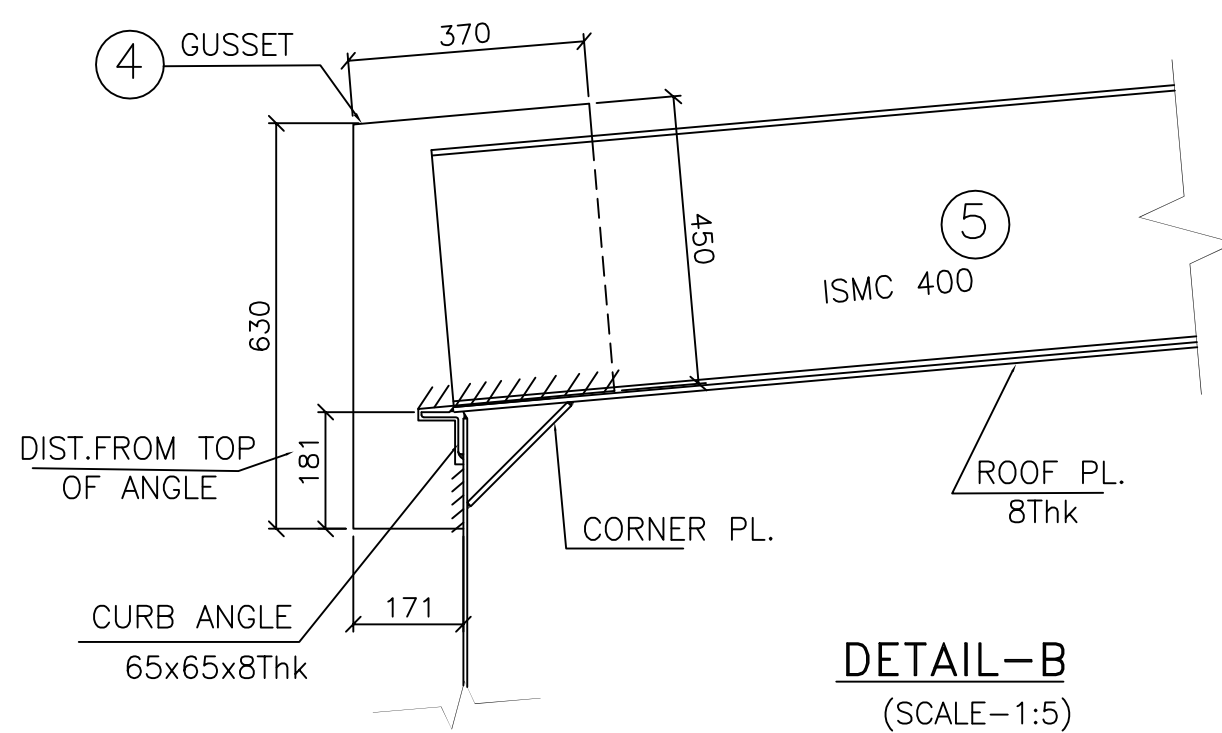
GUSSET PL.-3 (SCALE-1:5)



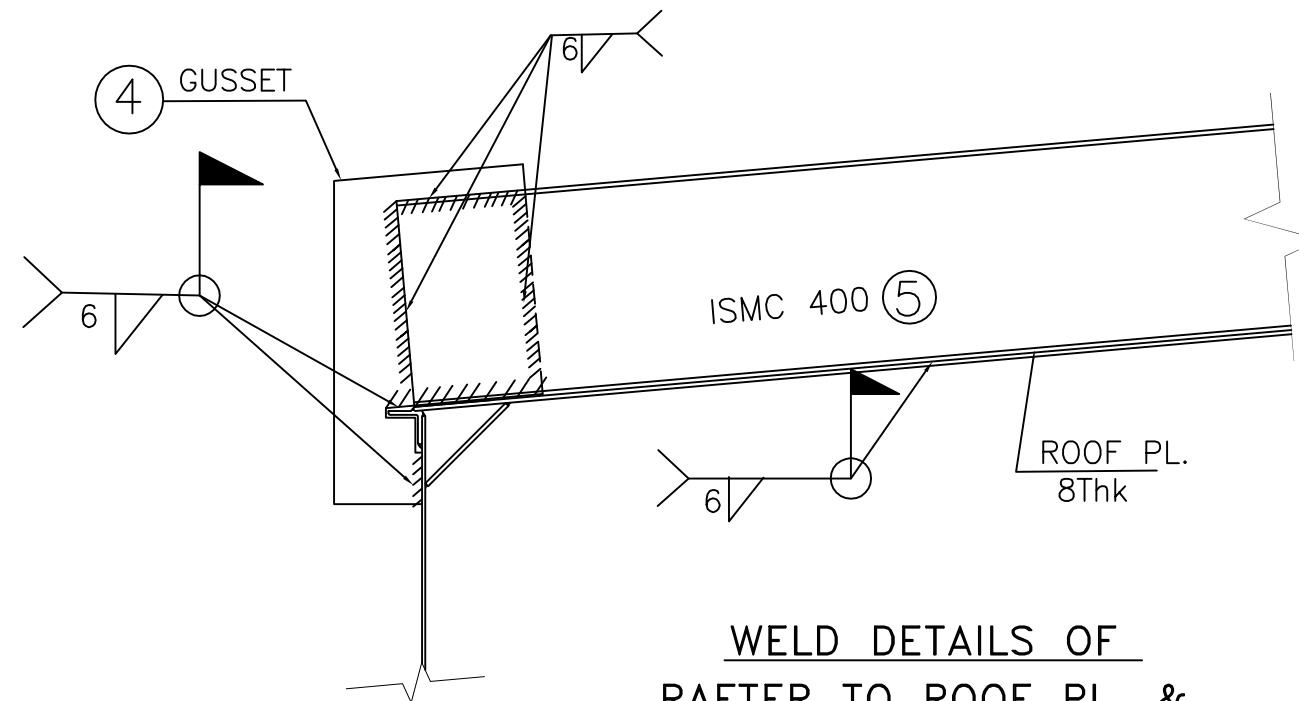
DETAIL OF CENTRAL DRUM TO GUSSET PL.-3



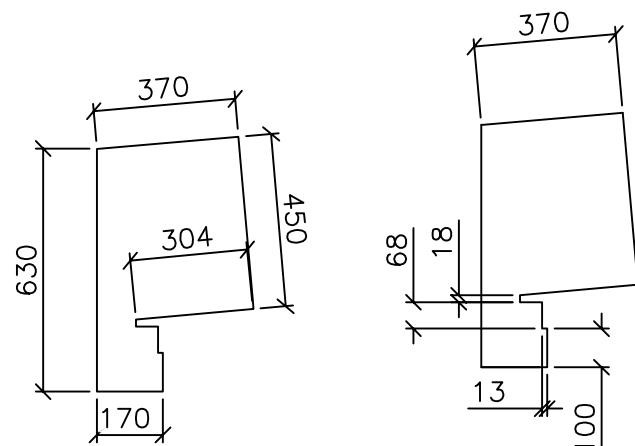
DETAIL OF MAIN RAFTER (SCALE-1:5)



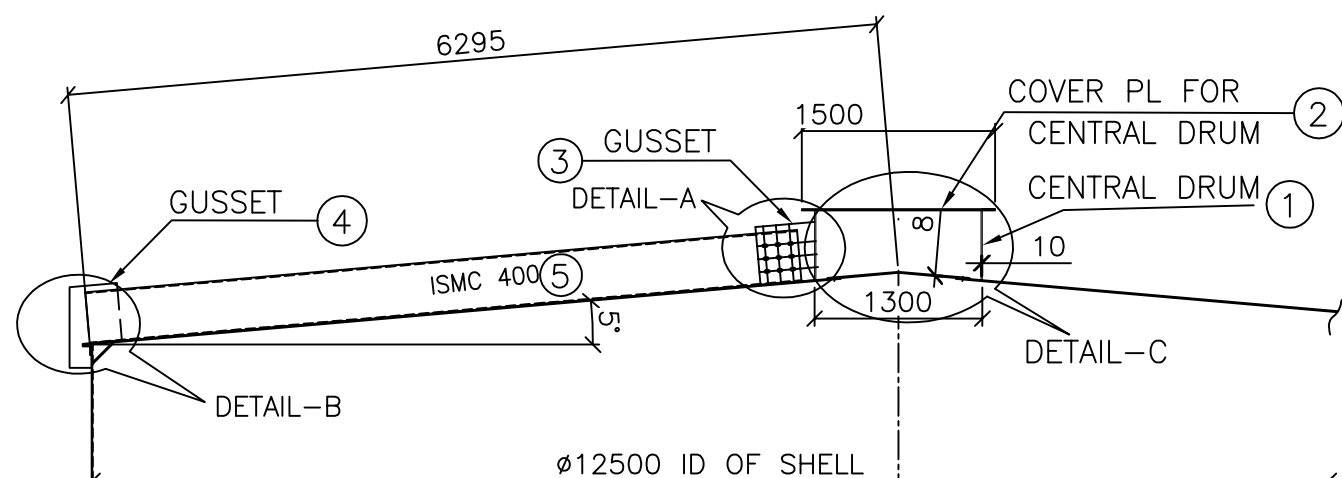
DETAIL-B (SCALE-1:5)



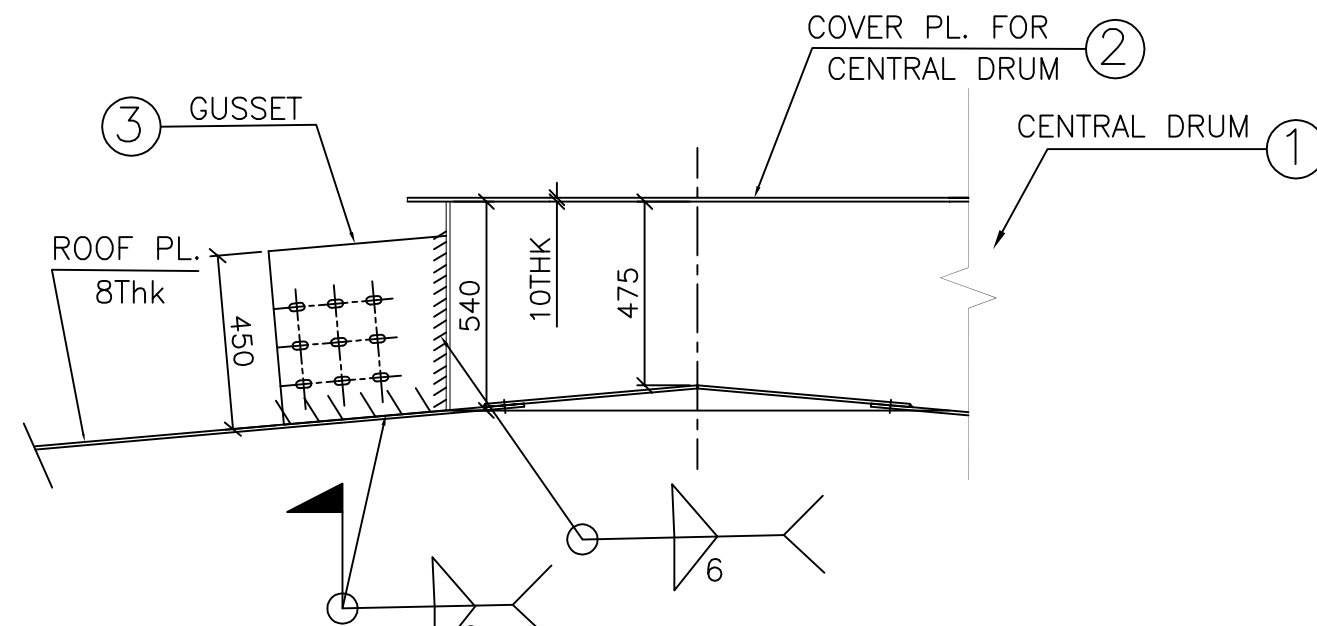
WELD DETAILS OF RAFTER TO ROOF PL. & GUSSET PL. (SCALE-1:4)



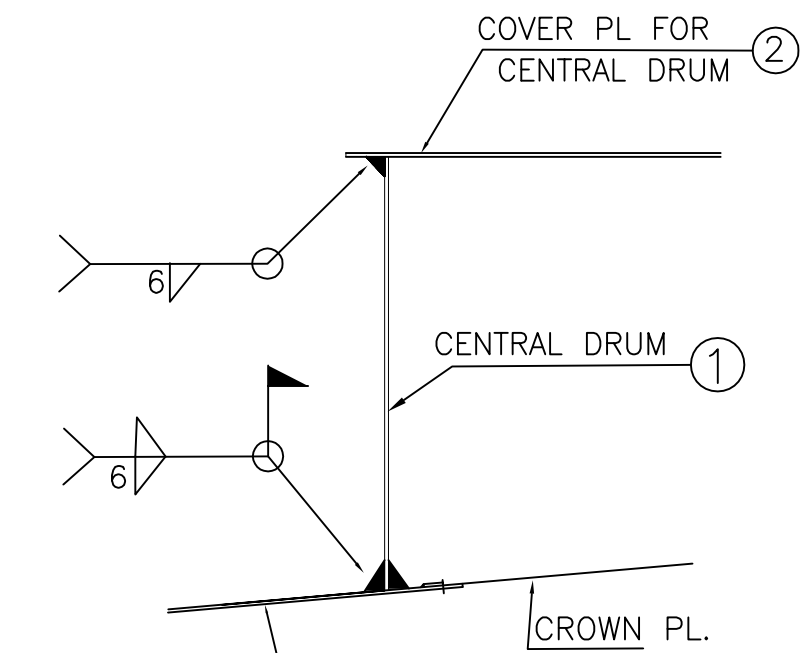
DETAIL OF GUSSET PL-4 (SCALE-1:3)



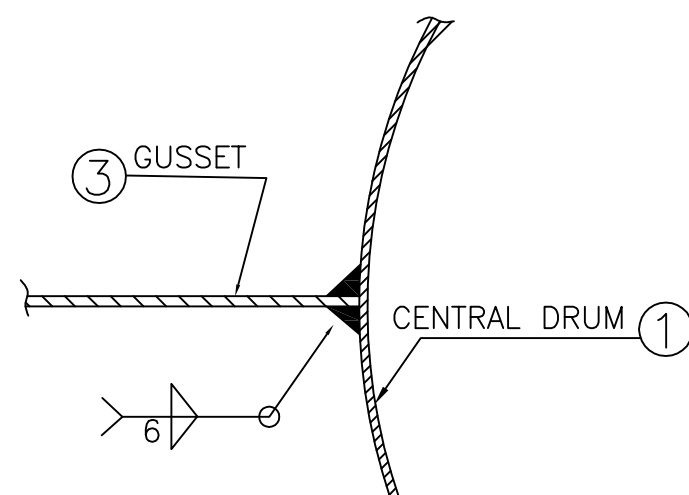
SECTION A-A



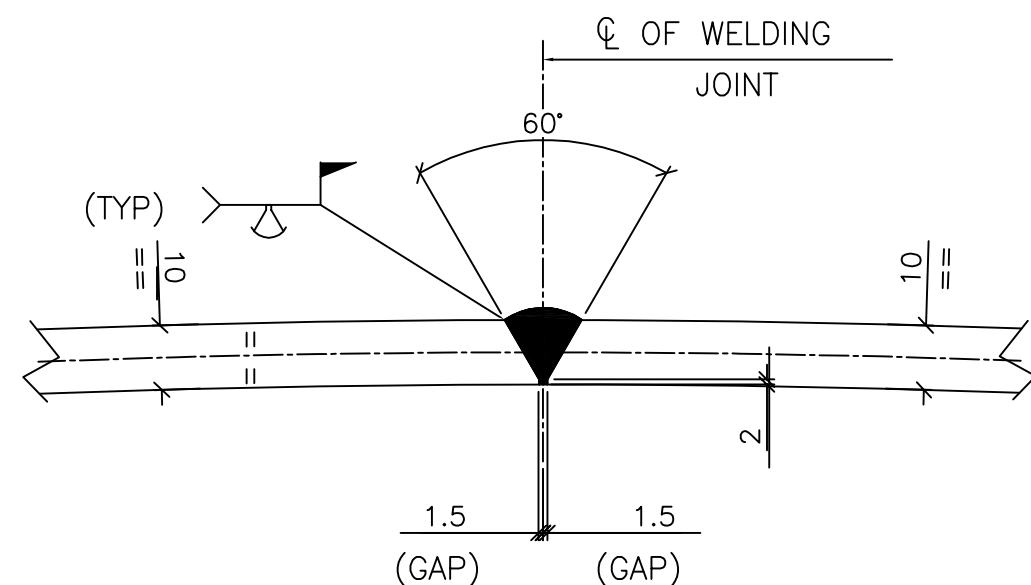
WELD DETAILS OF GUSSET PL.-3 TO CENTRAL DRUM



WELD DETAILS OF CENTRAL DRUM



PLAN VIEW WELD DETAILS OF GUSSET PL.-3 & CENTRAL DRUM (SCALE-1:2)



LONGITUDINAL WELD DETAILS OF CENTRAL DRUM (SCALE- N T S)

TYPICAL WELDING SYMBOLS

LOCATIONS	FILLET	GROOVE	
		SQUARE	BEVEL
ARROW SIDE			
OTHER SIDE			
BOTH SIDE			

RELEASED FOR ERECTION

NOTES:-

- 1.ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE NOTED.
- 2.ALL FILLET WELD TO BE 6MM UNLESS OTHERWISE SPECIFIED .
- 3.GAP BETWEEN RAFTER AND ROOF PL. TO BE FILLED WITH 6MM ALL AROUND FILLET WELD AT SITE.

SR NO	DESCRIPTION	SIZE	QTY	MATERIAL	WEIGHT PER UNIT (KG)	TOTAL WEIGHT (KG)
1	CENTRAL DRUM	540X4085X10TH K	1	IS 2062, Gr E250, B	173	173
2	COVER PL FOR CENTRAL DRUM	DIA 1500X10THK	1	IS 2062, Gr E250, B	138	138
3	GUSSET PL.	460X450X10THK	16	IS 2062, Gr E250, B	17	272
4	GUSSET PL.	410X630X10THK	16	IS 2062, Gr E250, B	21	336
5	ISMC 400	5540 LG	16	IS 2062, Gr E250, A	277.554	4440.864
6	ISMC 75	1674 LG	16	IS 2062, Gr E250, A	11.8854	190.1664
6	HEX BOLT	M16X70LG	160	ASTM A193 Gr B7	0.1	16
7	NUT	M16	160	ASTM A194 Gr 2H	0.03	4.8
8	2 WASHER	M16	320	STAINLESS STEEL	0.01	3.2
					Total Wt.	5574.0304

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)			
CUSTOMER:	TELANGANA STATE POWER GENERATION CO.LTD.			
PMC CONSULTANT	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI			
	BHARAT HEAVY ELECTRICALS LTD. HYDERABAD	NAME	SIGN.	DATE
		DRN. R.MURALIDHAR		07.10.21
		CHD. K.N.B.REDDY		07.10.21
DEPT. PE&SD CODE 450	UNTOL. DIMS. GR. E/M/P	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.
450		NTS	-N.A.-	-N.A.-
TITLE RAFTER SUPPORT DETAIL DRAWING FOR AUXILIARY ABSORBENT STORAGE TANK		CARD CODE	DRAWING NO. PYDH1M102844101	REV. 00
			SHT. No 1	NO. OF SHT. 1

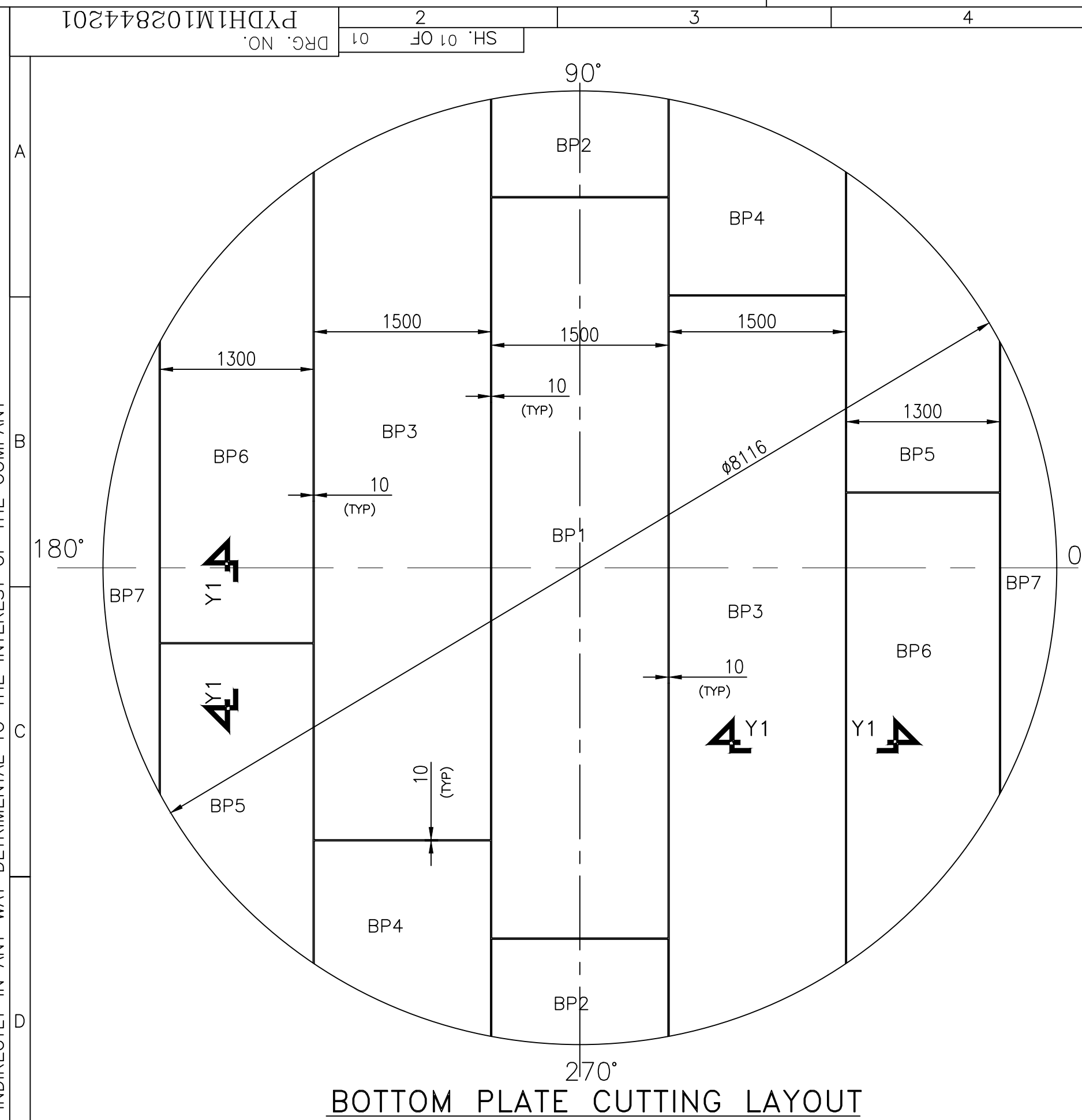
FABRICATION DRAWINGS FOR LIME STONE SLURRY STORAGE TANK

FOR TENDER PURPOSE ONLY

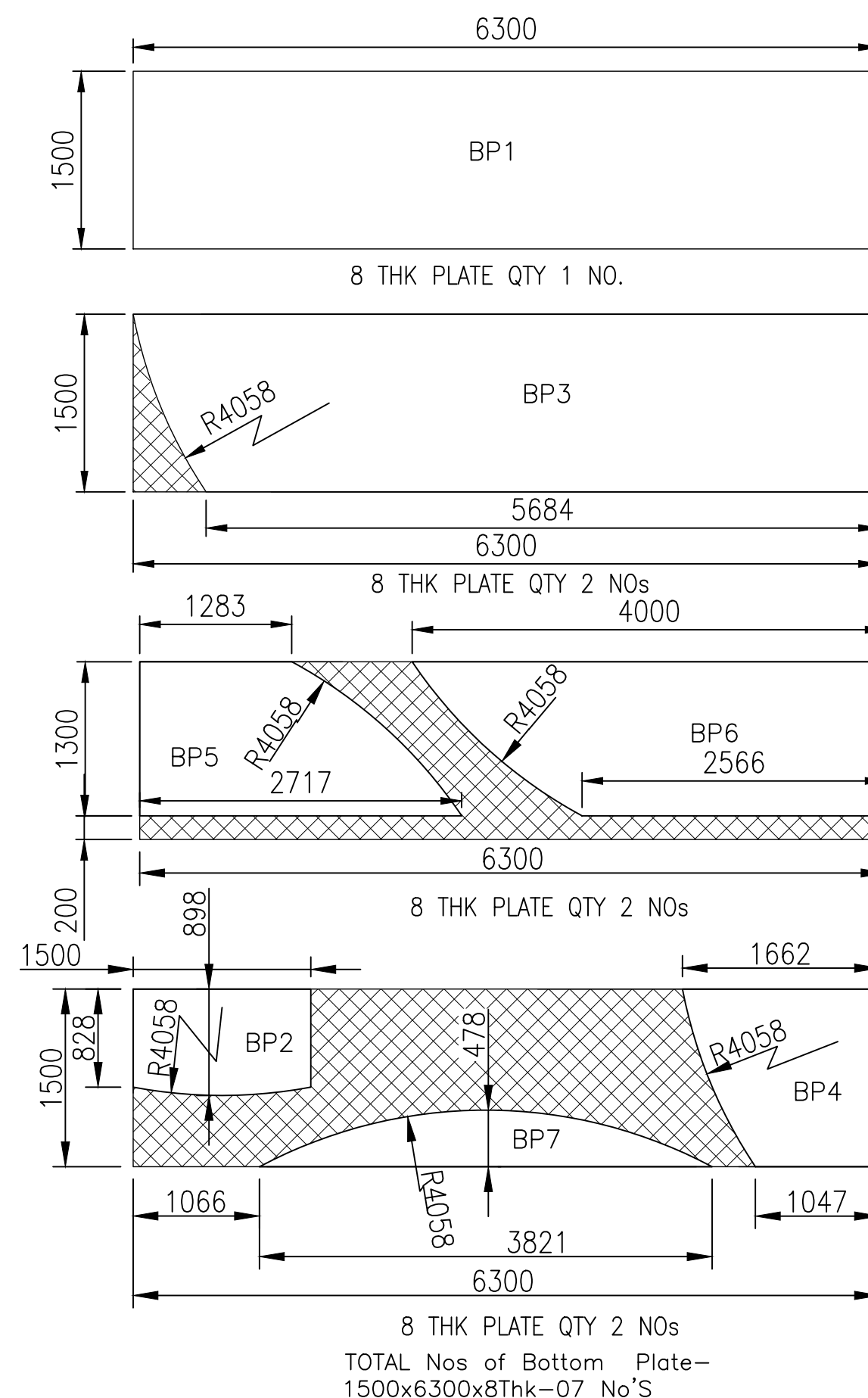
LIST OF DRAWINGS:

1. BOTTOM PLATE CUTTING LAYOUT
2. SHELL PLATE CUTTING LAYOUT
3. ROOF PLATE CUTTING LAYOUT
4. CORNER PLATE DETAIL DRAWING
5. STAIRCASE DETAIL DRAWING
6. NOZZLE DETAIL DRAWING
7. AGITATOR & ROOF STRUCTURE DETAIL DRAWING

00	17.05.23	INITIAL SUBMISSION																											
REV	DATE	DESCRIPTION																											
PROJECT		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)																											
CUSTOMER		 TELANGANA STATE POWER GENERATION CO.LTD.																											
CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS, VASHI, NAVI MUMBAI.																											
ADDITIONAL INFORMATION		 BHARAT HEAVY ELECTRICALS LTD. PE & SD HYDERABAD <table border="1"> <thead> <tr> <th></th> <th>NAME</th> <th>SIGN.</th> <th>DATE</th> <th>NO.OF VAR.</th> </tr> </thead> <tbody> <tr> <td>DRN.</td> <td>RATISH KUMAR</td> <td></td> <td>24.04.23</td> <td rowspan="3"></td> </tr> <tr> <td>CHD.</td> <td>R.MURALIDHAR</td> <td></td> <td>24.04.23</td> </tr> <tr> <td>APPD.</td> <td>M.S.S.NAGESH</td> <td></td> <td>24.04.23</td> </tr> </tbody> </table>											NAME	SIGN.	DATE	NO.OF VAR.	DRN.	RATISH KUMAR		24.04.23		CHD.	R.MURALIDHAR		24.04.23	APPD.	M.S.S.NAGESH		24.04.23
	NAME											SIGN.	DATE	NO.OF VAR.															
DRN.	RATISH KUMAR												24.04.23																
CHD.	R.MURALIDHAR												24.04.23																
APPD.	M.S.S.NAGESH		24.04.23																										
STATUS OF DRAWING																													
DISTRIBUTION OF PRINTS																													
MANUFACTURER:		<table border="1"> <tr> <td>DEPT.</td> <td>PESD</td> <td>UNTOL. DIM.</td> <td rowspan="2">  </td> <td>SCALE</td> <td>WEIGHT (KG)</td> <td>REF. TO ASSY DRG.</td> <td>ITEM NO.</td> <td>NO.OF ITEMS</td> </tr> <tr> <td>CODE</td> <td>450</td> <td>GR. C/M/F</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										DEPT.	PESD	UNTOL. DIM.		SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS	CODE	450	GR. C/M/F						
DEPT.	PESD	UNTOL. DIM.		SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS																					
CODE	450	GR. C/M/F																											
CUSTOMER PACKAGE CODE		FPS		TITLE: FABRICATION DRAWINGS FOR LIME STONE SLURRY STORAGE TANK						DOCUMENT NO PYDH1M162844201		REV. 00																	
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M	C	E	I	L																									
☒	☐	☐	☐	☐																									
				SHT No.		01		NO OF SHT.		01																			



BOTTOM PLATE CUTTING LAYOUT



Backing Plate BOM		
Backing Plate Sr Nos	Size	QTY
1	5500X50X8THK	02
2	2484X50X8THK	02
3	4892X50X8THK	02
4	1876X50X8THK	02
5	3932X50X8THK	02
6	1460X50X8THK	04
7	1260X50X8THK	02

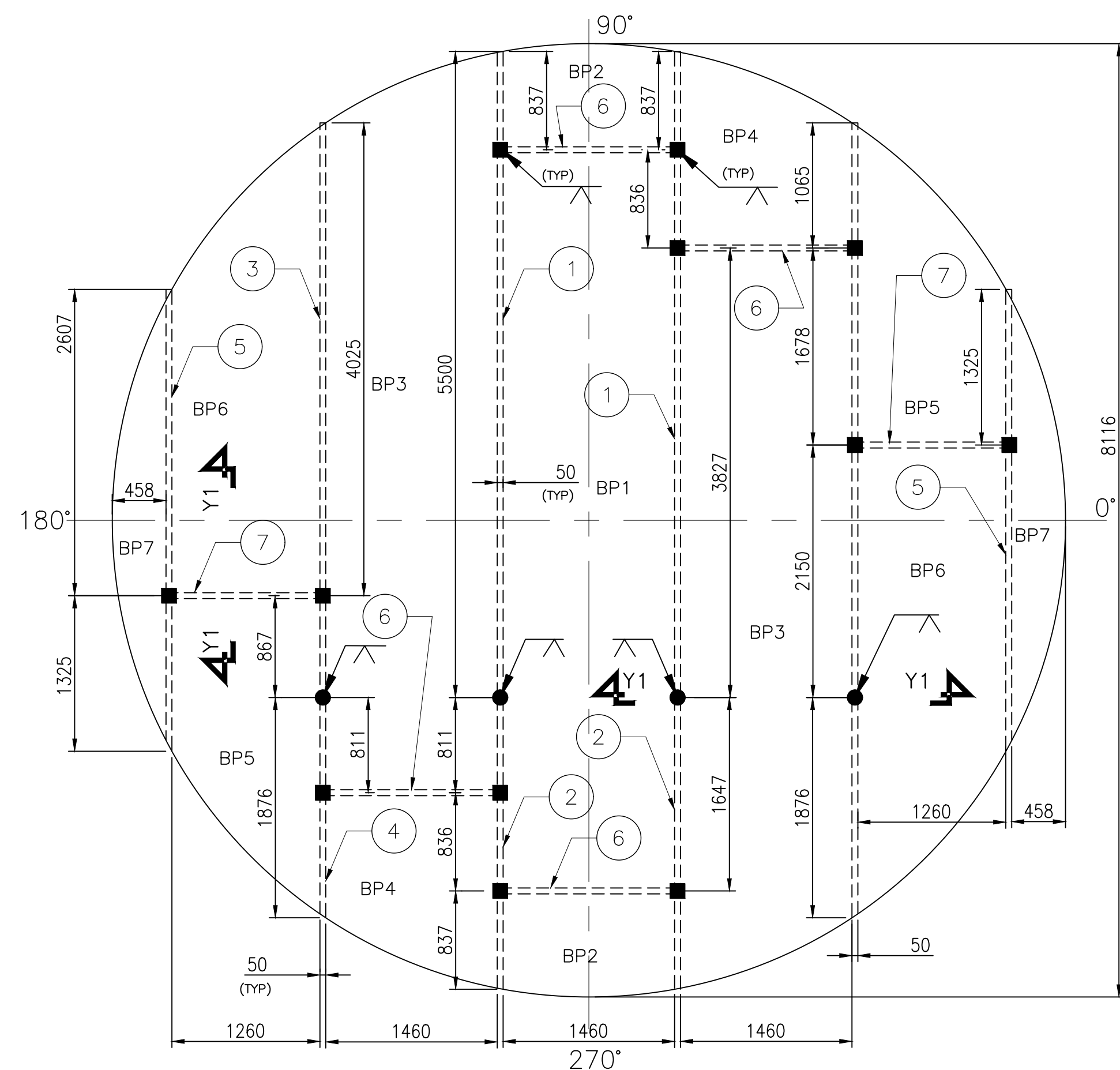
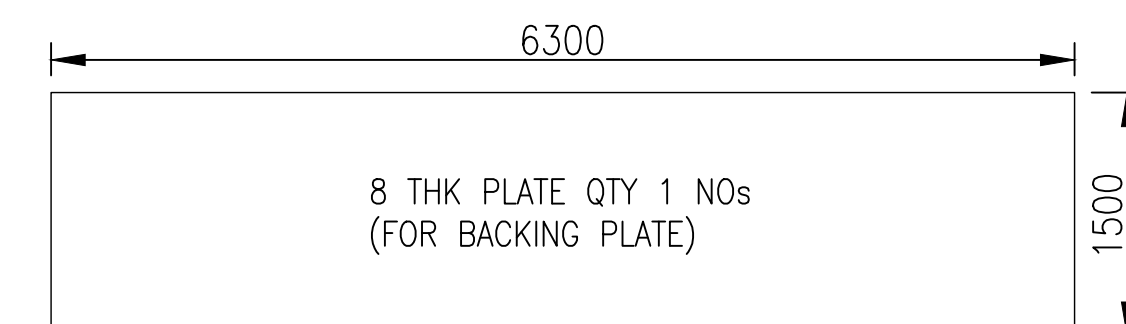
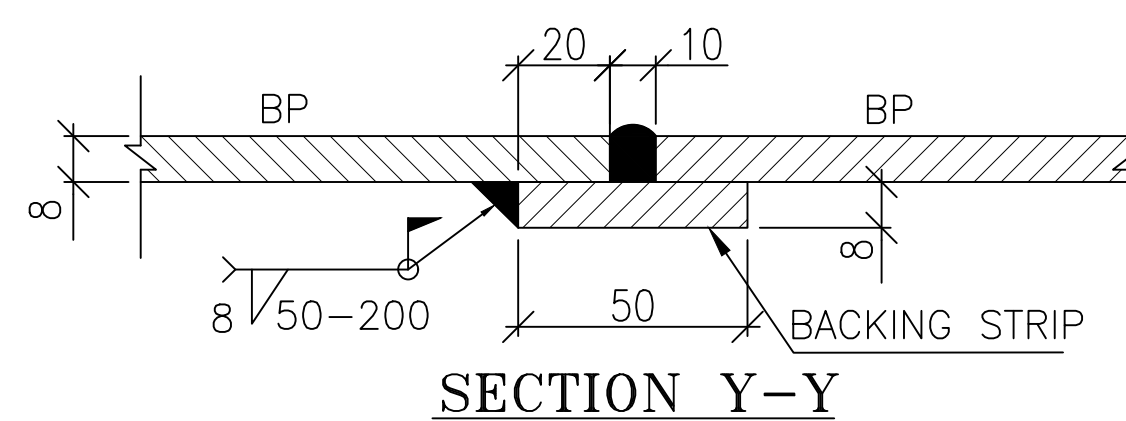
TOTAL Nos of Backing Plate-
1500x6300x8Thk-01 No'S

NET QUANTITY REQUIRED FOR ONE TANK (BOTTOM)						
S.NO	ITEM	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	BP1	PLATE	IS 2062 Gr E250 B	1500x6300x8Thk	1	593.46
2	BP2	PLATE	IS 2062 Gr E250 B	1500x898x8Thk	2	169.1832
3	BP3	PLATE	IS 2062 Gr E250 B	1500x6300x8Thk	2	1186.92
4	BP4	PLATE	IS 2062 Gr E250 B	1500x1662x8Thk	2	313.1208
5	BP5	PLATE	IS 2062 Gr E250 B	1300x2717x8Thk	2	443.6318
6	BP6	PLATE	IS 2062 Gr E250 B	1300x4000x8Thk	2	653.12
7	BP7	PLATE	IS 2062 Gr E250 B	478x3821x8Thk	2	229.4006
TOTAL NET WEIGHT						3589

GROSS QUANTITY REQUIRED FOR ONE TANK (BOTTOM PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	S 2062 Gr E250 B	1500x6300x8Thk	7	4154
TOTAL GROSS WEIGHT					4154

1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	PLATE QTY. SHOWN FOR ONE TANK ONLY
4	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING SPEC.
5	ANY MINOR DIMENSIONAL MARKING SHALL BE ADJUSTED AT SITE.
6	ALL THE JOINTS FOR BOTTOM PLATE ARE LAP JOINTS

S.NO.	DRAWING/DOCUMENT
1	PROCESS P&ID LIMESTONE SLURRY STORAGE TANK
2	GA DRAWING OF LIMESTONE SLURRY STORAGE TANK
3	FOUNDATION INPUT DETAIL DRAWING OF LIMESTONE SLURRY STORAGE TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

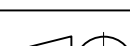


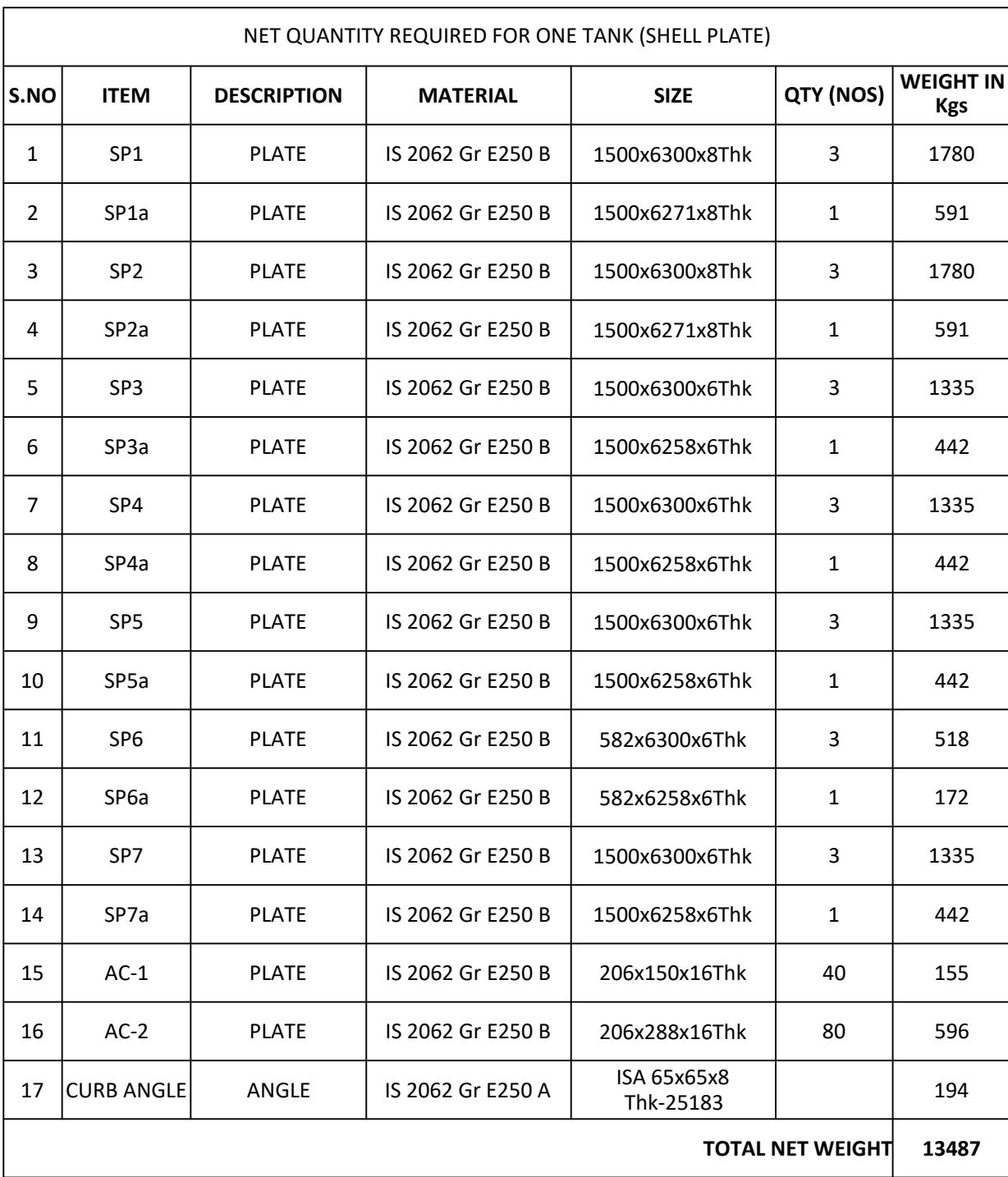
BACKING STRIP LAYOUT

ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	MURALIOH
CHD/APPD			CHD/APPD			CHD/APPD		02	CHD/APPD		01	18.03.22	CHD/APPD K.N.B. REDUCED
	ZONE			ZONE			ZONE			ZONE			DRAIN SUMP IS REMOVED.

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT (FGD PACKAGE)
CUSTOMER:	 TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

				BHARAT HEAVY ELECTRICALS LTD. HYDERABAD				NAME		SIGN.		DATE		NO. OF.			
				DRN.		R.MURALIDHAR						07.10.21		VAR.			
				CHD.		K.N.B.REDDY						07.10.21		-N.A.-			
				APPD.		M.S.S. ASHLY						07.10.21					
DEPT. P&ESD CODE 450		UNTOL. DIMS. GR. Ø/M/P		SCALE		WEIGHT (KG)		REF. TO ASSEY. DRG.				ITEM NO.		NO. OF.			
				NTS		-N.A.-		-N.A.-				-N.A.-		-N.A.-			
TITLE BOTTOM PLATE CUTTING LAYOUT DRAWING OF LIMESTONE SLURRY STORAGE TANK								CARD CODE		DRAWING NO.						REV. 00	
										PYDH1M102844101							
										SHT. NO. 1 NO. OF SHT. 1							



GROSS QUANTITY REQUIRED FOR ONE TANK (SHELL PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	IS 2062 Gr E250 B	1500x6300x8Thk	1	593
2	PLATE	IS 2062 Gr E250 B	1500x6300x6Thk	8	3561
3	PLATE	IS 2062 Gr E250 B	582x6300x6Thk	18	3109
4	PLATE	IS 2062 Gr E250 B	206x150x16Thk	1	172
5	PLATE	IS 2062 Gr E250 B	206x288x16Thk	1	445
6	ANGLE	IS 2062 Gr E250 A	ISA 65x65x8Thk. - 25183 Lg.		194
TOTAL GROSS WEIGHT					8073

	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	ADJUSTMENT SHALL BE DONE ON THE LAST SPOOL PIECE, IF REQUIRED TO MAINTAIN TOTAL DESIRED LENGTH.
4	PLATE QTY. SHOWN FOR ONE TANK ONLY.
5	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING.
5	ALL SHELL PLATES, CURB ANGLE & REINFORCEMENT PLATES SHALL BE BENT TO TANK OUTER RADIUS.

S.NO.	DRAWING/DOCUMENT
1	PROCESS P&ID LIMESTONE SLURRY STORAGE TANK
2	GA DRAWING OF LIMESTONE SLURRY STORAGE TANK
3	FOUNDATION INPUT DETAIL DRAWING OF LIMESTONE SLURRY STORAGE TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

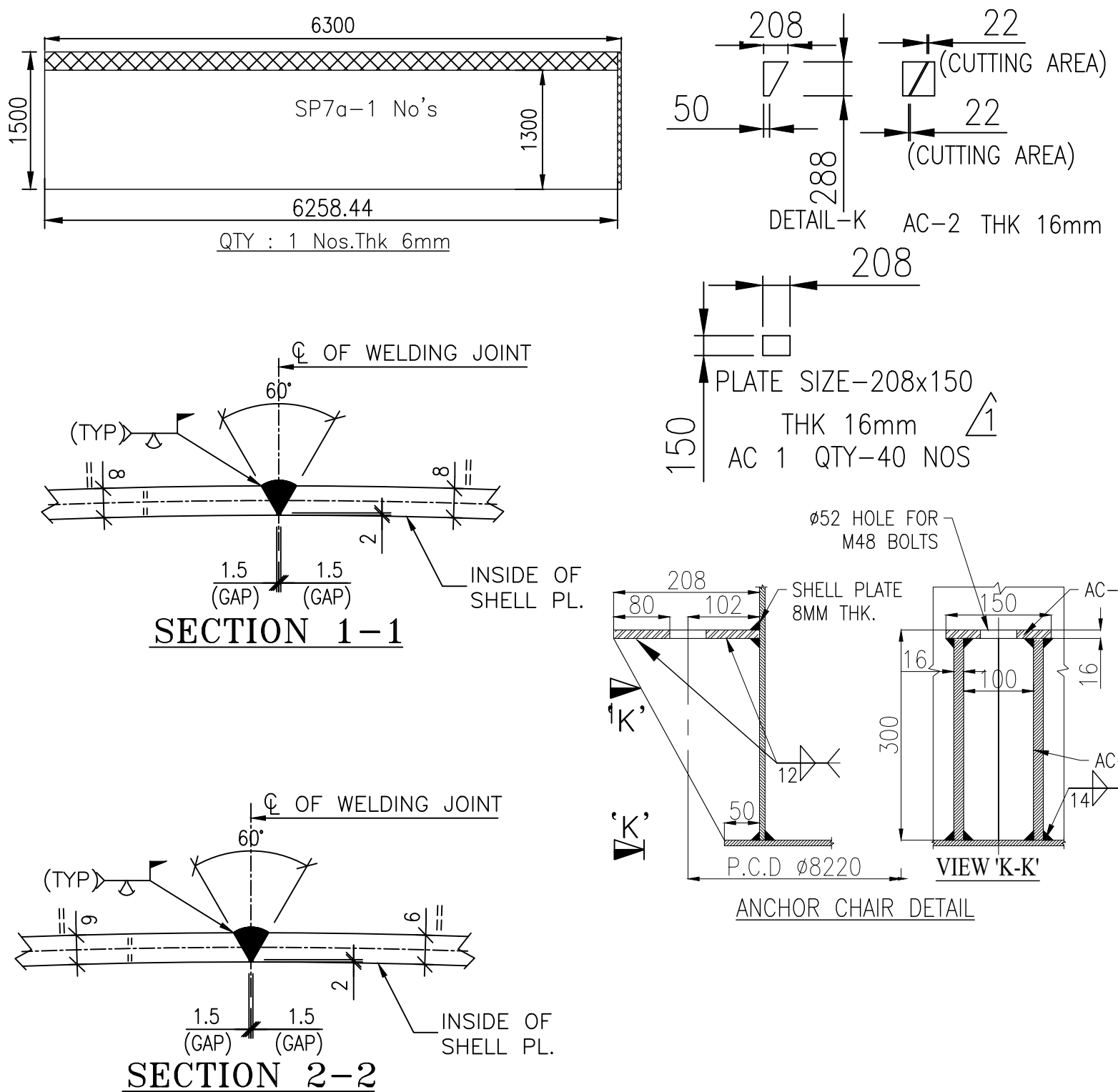
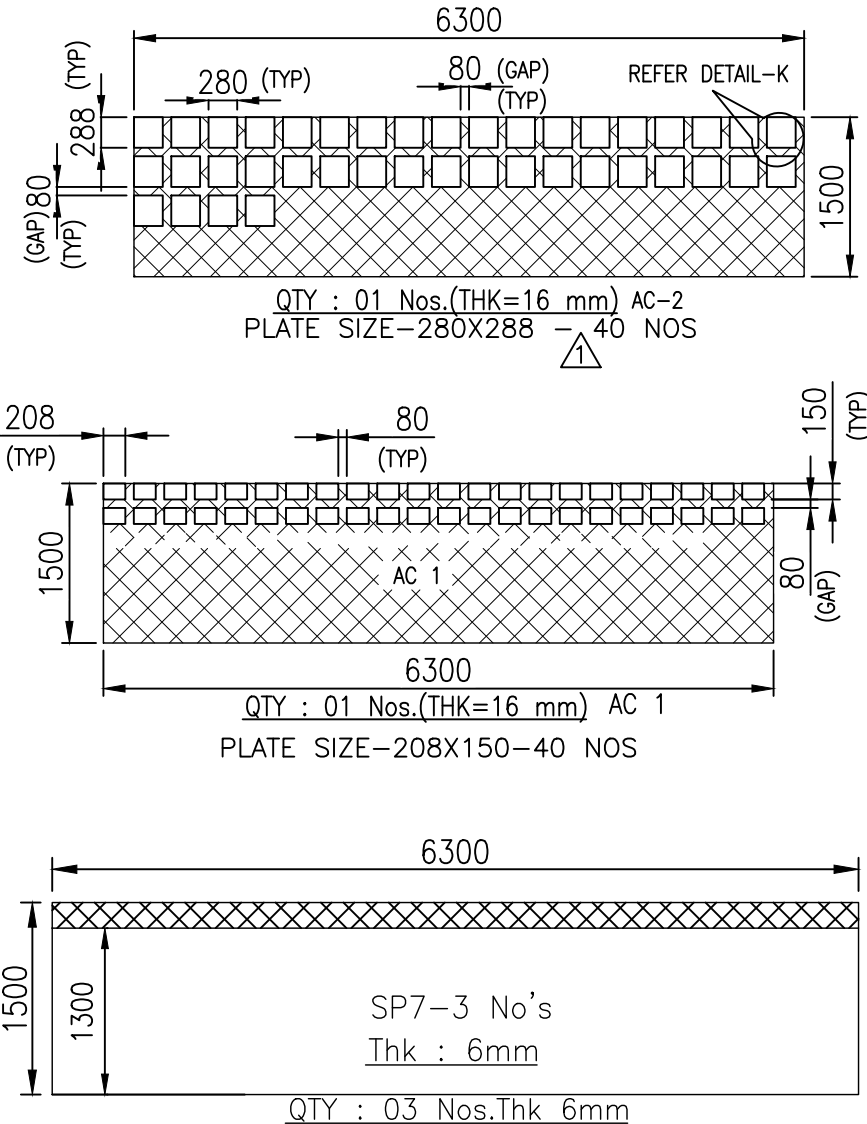
FOR TENDER PURPOSE ONLY

TELANGANA STATE POWER GENERATION CO.LTD.

 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME	SIGN.	DATE	NO. OF VAR.
	DRN.	R.MURALIDHAR		07.10.21	-N.A.
	CHD.	K.N.B.REDDY		07.10.21	
	APPD.	M.S.S NAGESH		07.10.21	

TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF LIMESTONE SLURRY STORAGE TANK	CARD CODE	DRAWING NO.	REV
		PYDH1M102844101	00
		SHT. No 1	NO. OF SHT. 1

INVENTORY NO



REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHD/APPD			CHD/APPD			CHD/APPD	02		CHD/APPD	01		MURALIDHAR
ZONE			ZONE			ZONE			ZONE			ZONE	18.03.22	CHD/APPD/K.N.B. REDD
														ANCHOR CHAIR DETAILS ARE UPDATED.
5			6			7			8			9		

FIRST ANGLE PROJECTION

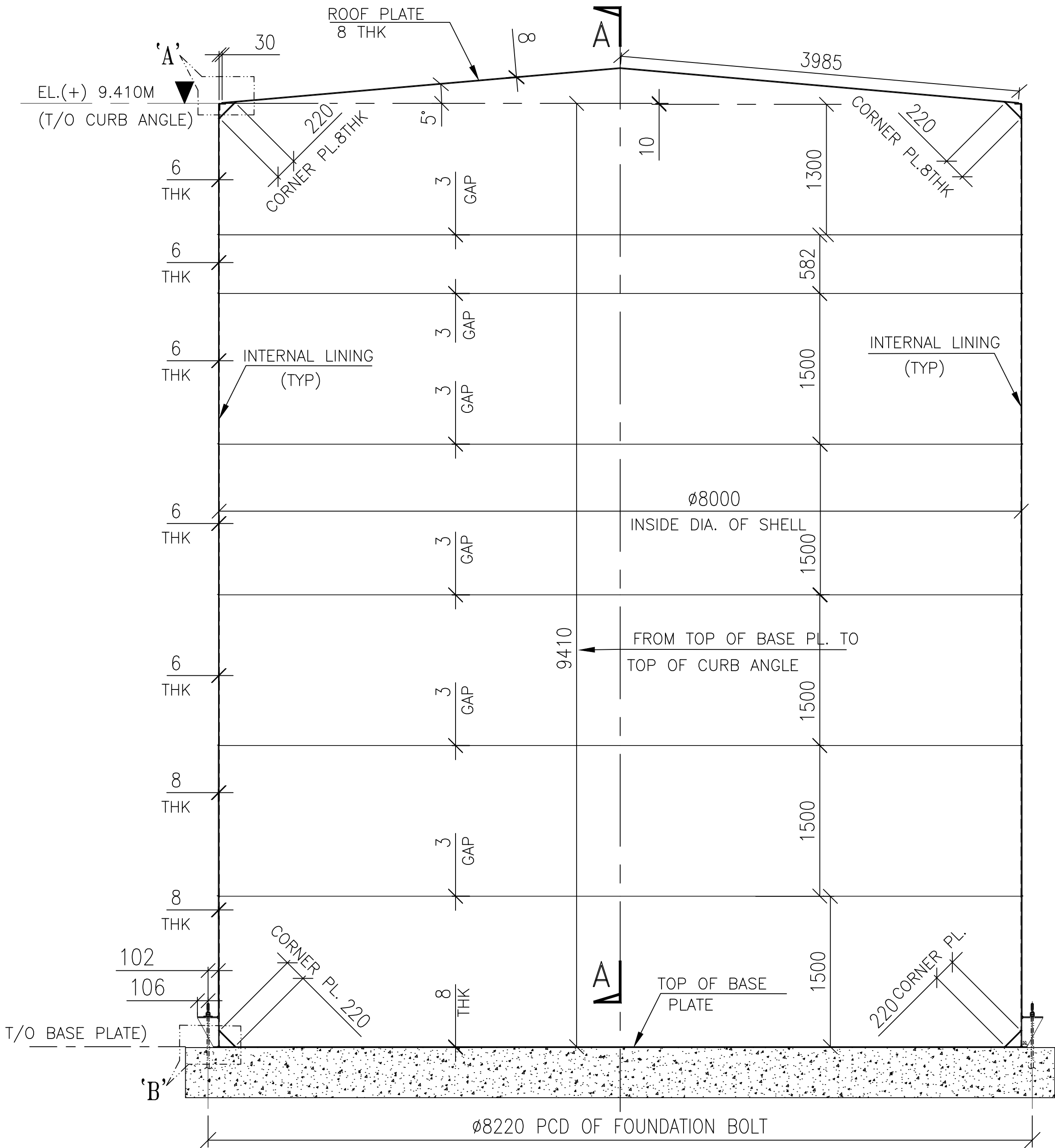
(ALL DIMENSIONS ARE IN mm)

20240844101
PYDH1M102844101
DRC. NO. 02
SH. 02 OF 02

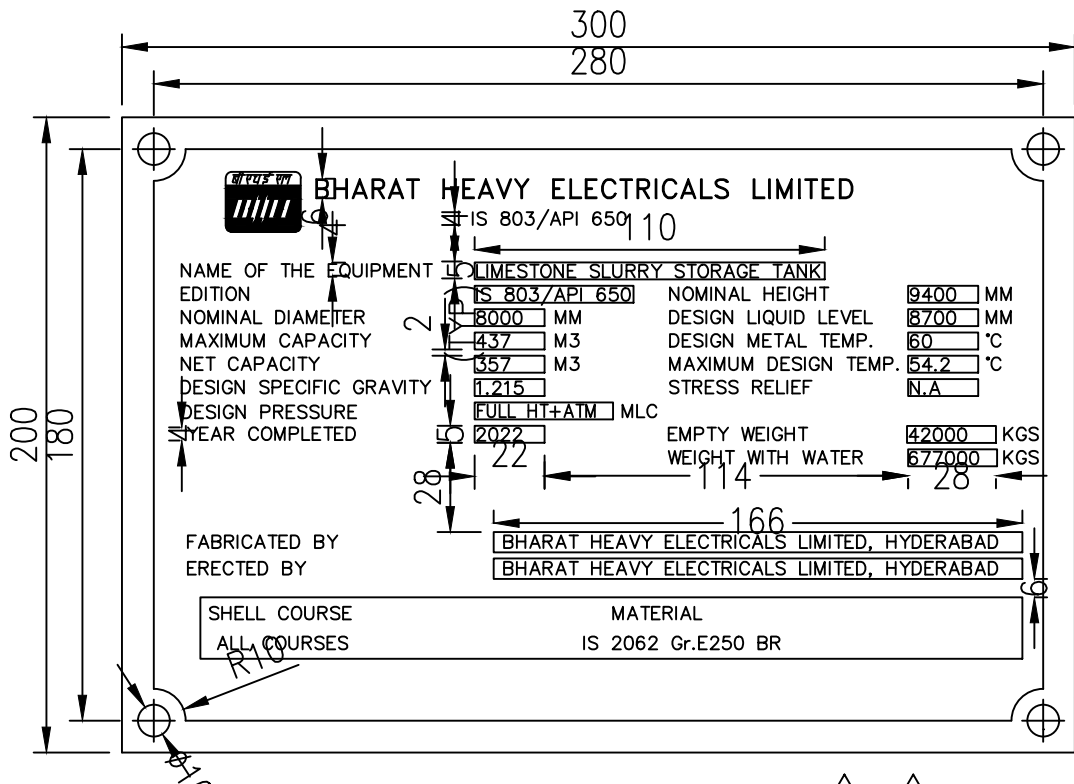
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

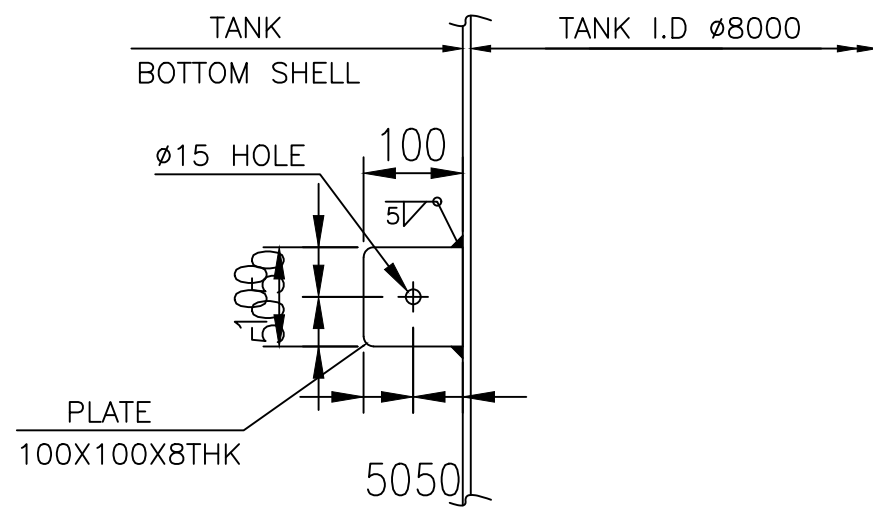
INVENTORY NO
SIGN. AND DATE
REF. DRG. NO.
COMPUTER FILE NAME
13810105833-S01-R00



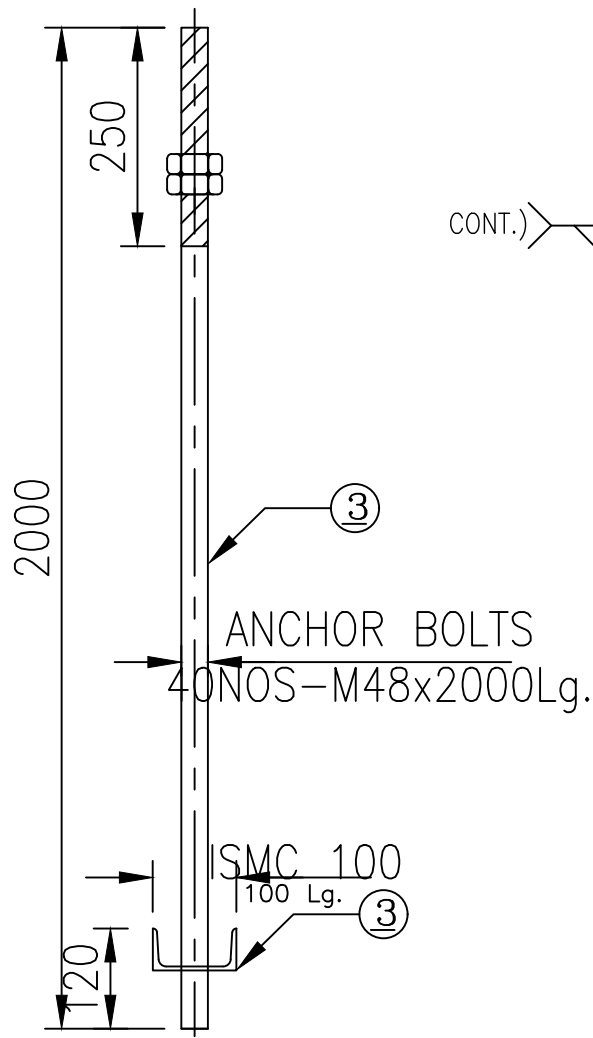
LIME STONE SLURRY STORAGE TANK (Ø 8 M x 9.4 M HEIGHT)



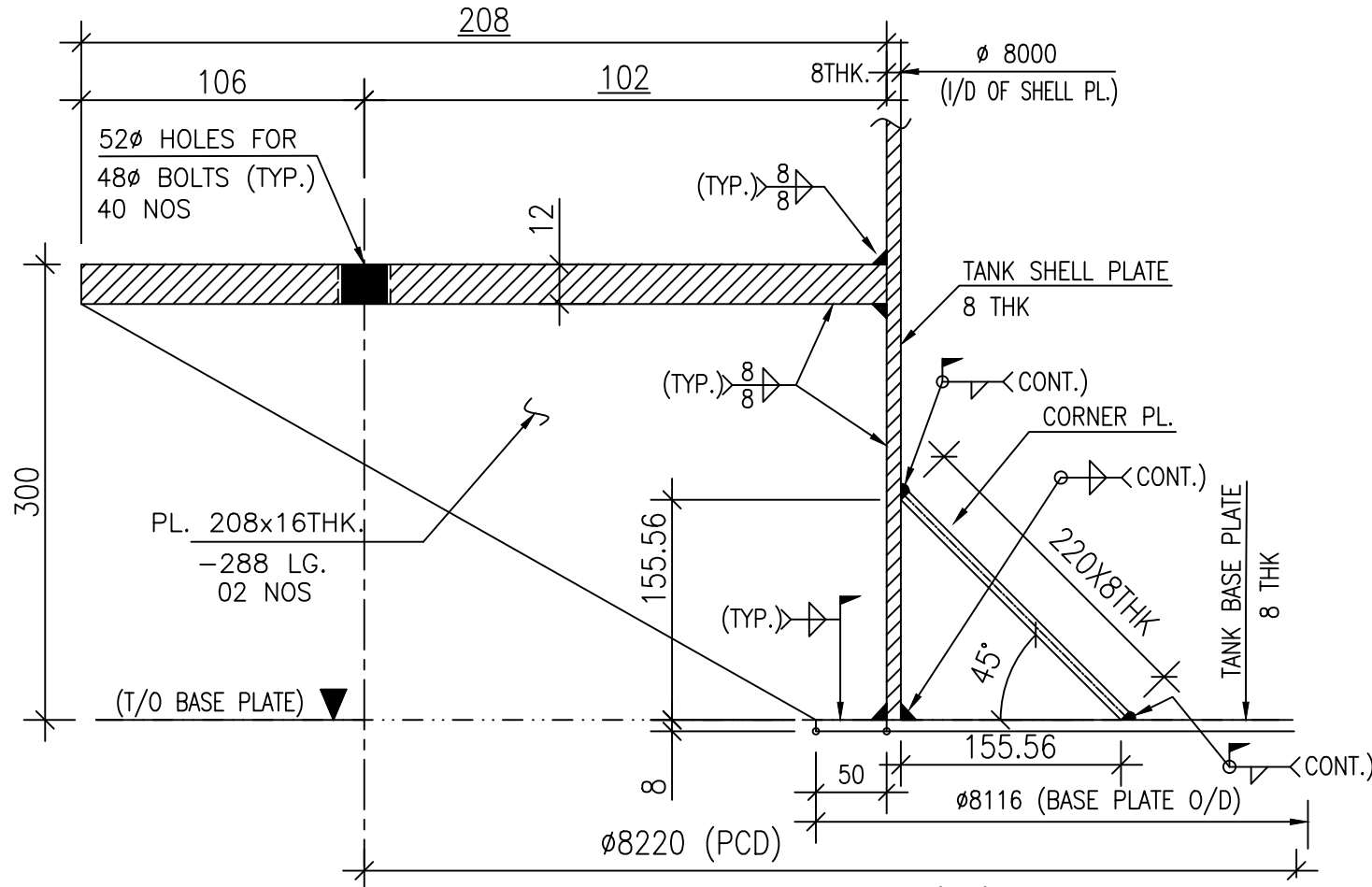
NAME PLATE DETAILS ①/R2/R4



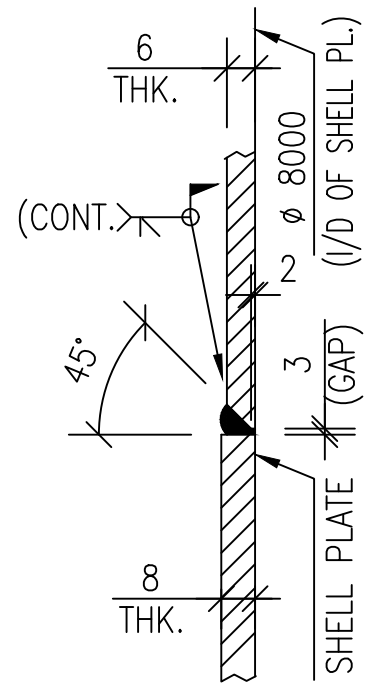
DETAIL OF EARTHING STRIP ②



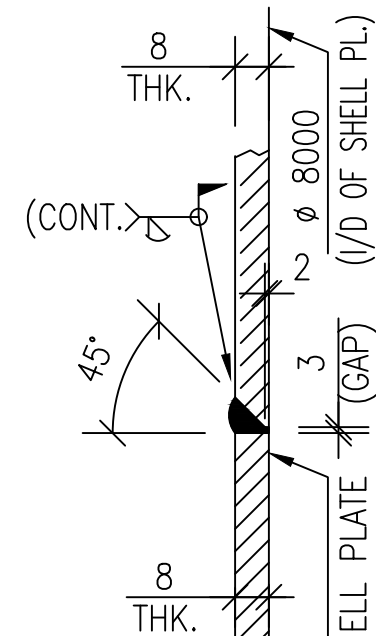
DETAIL OF ANCHOR BOLTS
QTY : 40Nos.



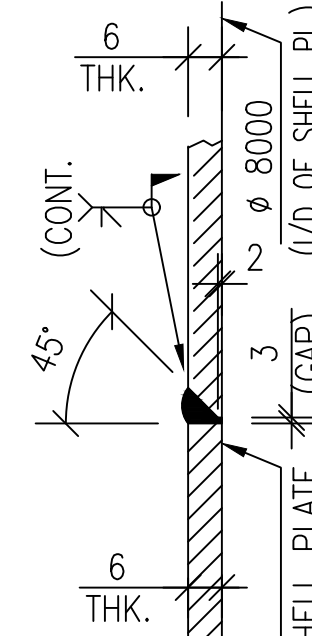
DETAIL-B'



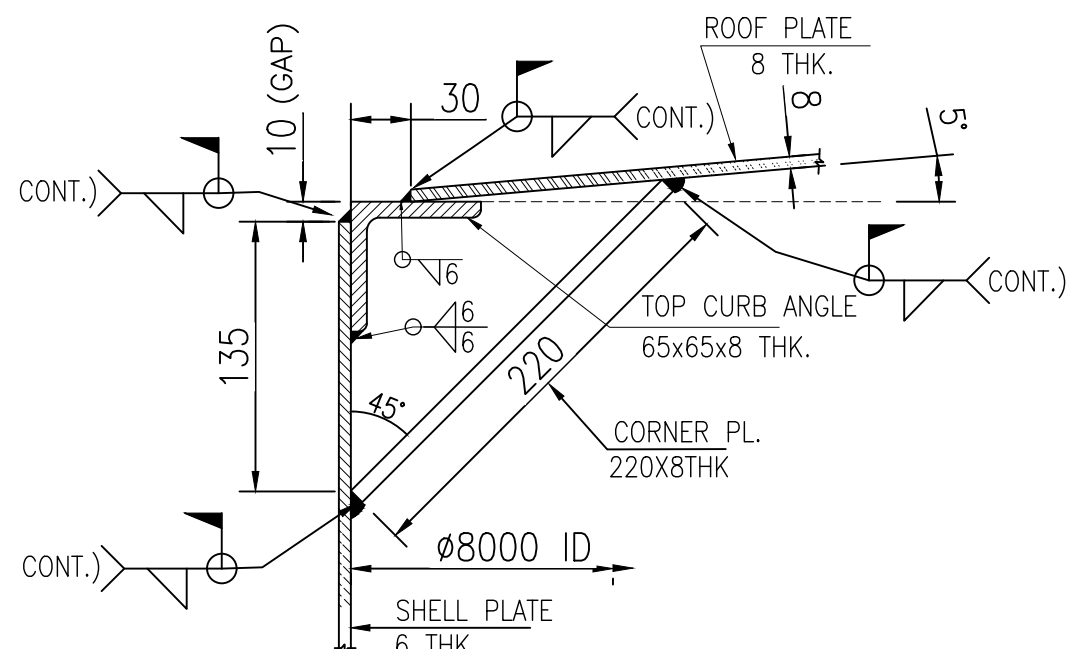
DETAIL-D2'



DETAIL-D1'



DETAIL-D3'



DETAIL-A'

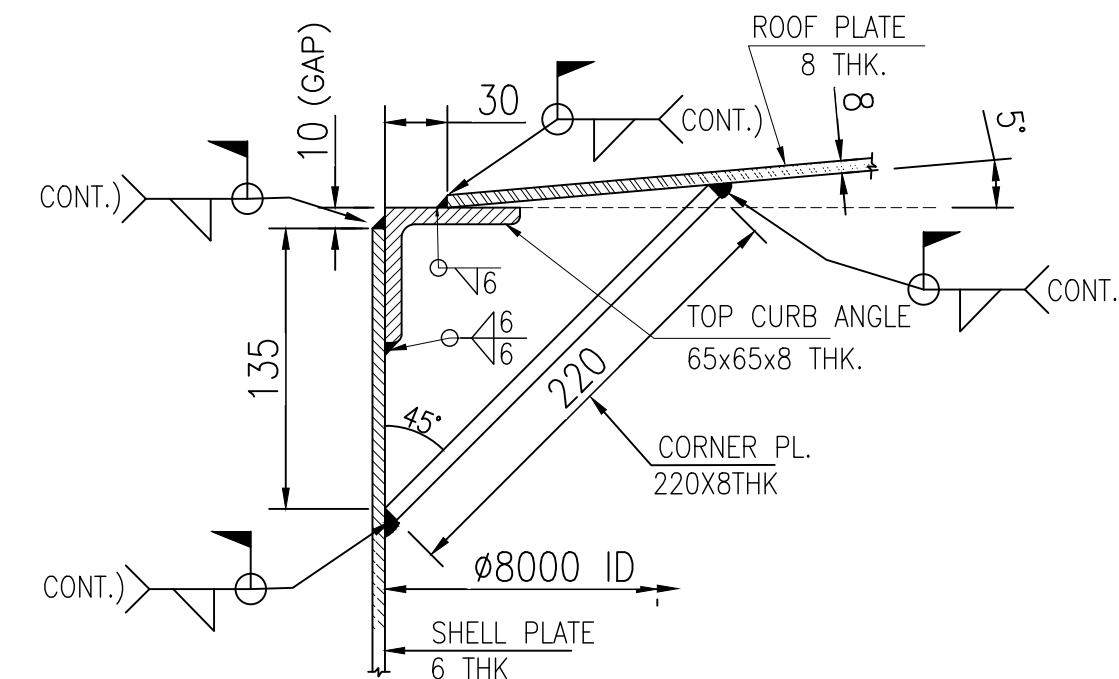
S.No.	Description	Material	Size	Quantity	Unit Wt. (Kgs)	Total Wt. (Kgs)
1	NAME PLATE	SS 304	200x300x2 thk	1	--	--
2	EARTHING LUG	SS 304	100x100x8 thk	2	0.63	1.26
3	ANCHOR BOLTS & NUTS	S 2062/ IS 1367	M48 X 2000LG	40	28.41	1136.4
Total Net Weight						1137.66

FOR TENDER PURPOSE ONLY

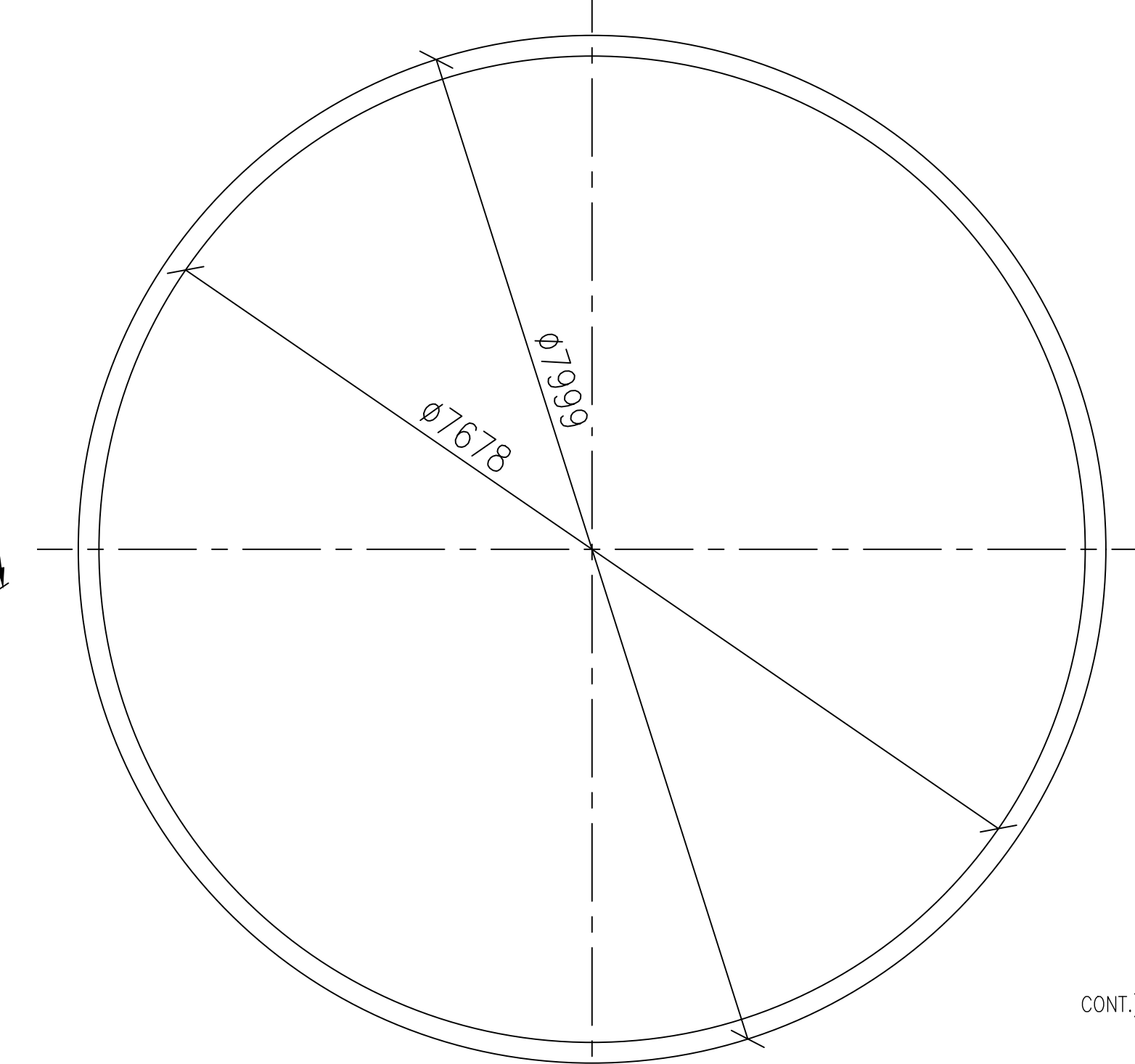
PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)
CUSTOMER:	TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

BH&E BHARAT HEAVY ELECTRICALS LTD. HYDERABAD	DRN.	R.MURALIDHAR	SIGN.	DATE	NO.OF VAR.
	CHD.	K.N.B.REDDY		07.10.21	-N.A.-
	APPD.	M.S.S. NAGESH		07.10.21	-N.A.-
DEPT. PE&SD CODE 450	UNTO. DIMS. GR. 2/M/7	SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-
TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF LIMESTONE SLURRY STORAGE TANK			CARD CODE	DRAWING NO. PYDH1M102844101	REV. 00
			SHT. No 1	NO. OF SHT. 1	

		BHARAT HEAVY ELECTRICALS LTD.				NAME		SIGN.		DATE		NO. OF VAR.			
		HYDERABAD				DRN.		R.MURALIDHAR				07.10.21			
						CHD.		K.N.B.REDDY				07.10.21		-N.A.-	
						APPD.		M.S.S. NAGESH				07.10.21			
DEPT. / EXCD CODE 450		UNTL. DIMS. GR. 2/M/7				SCALE NTS		WEIGHT (KG) -N.A.-		REF. TO ASSY. DRG. -N.A.-		ITEM NO. -N.A.-		NO. OF ITEMS -N.A.-	
TITLE CORNER PLATE DETAIL. DRAWING OF LIMESTONE SLURRY STORAGE TANK										CARD CODE PYDH1M102844101		REV. 00			
										SHT. NO. 1		NO. OF SHT. 1			



ROOF CORNER PLATE



DIAMETER OF CORNER PLATE (AFTER FABRICATION)

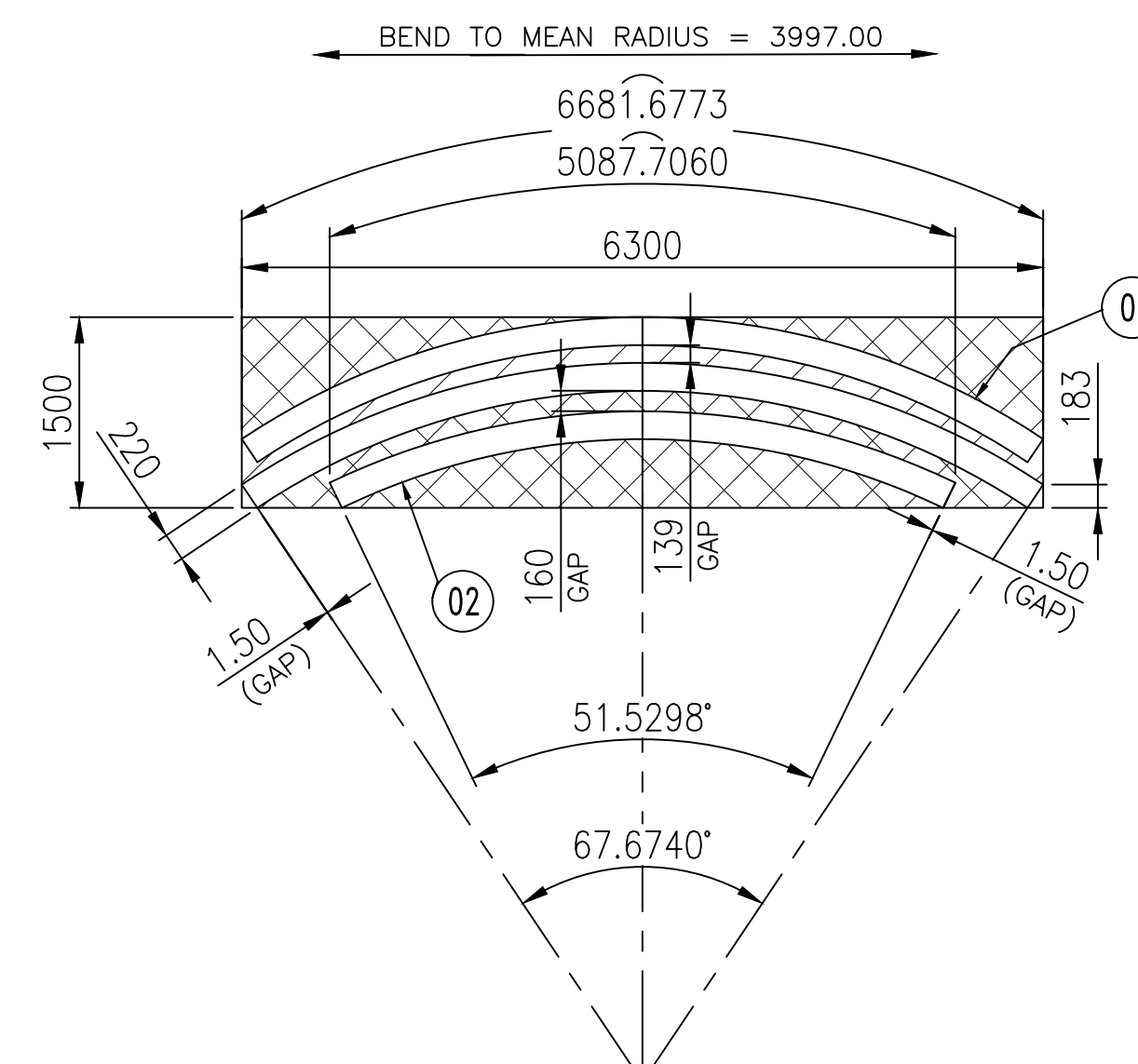
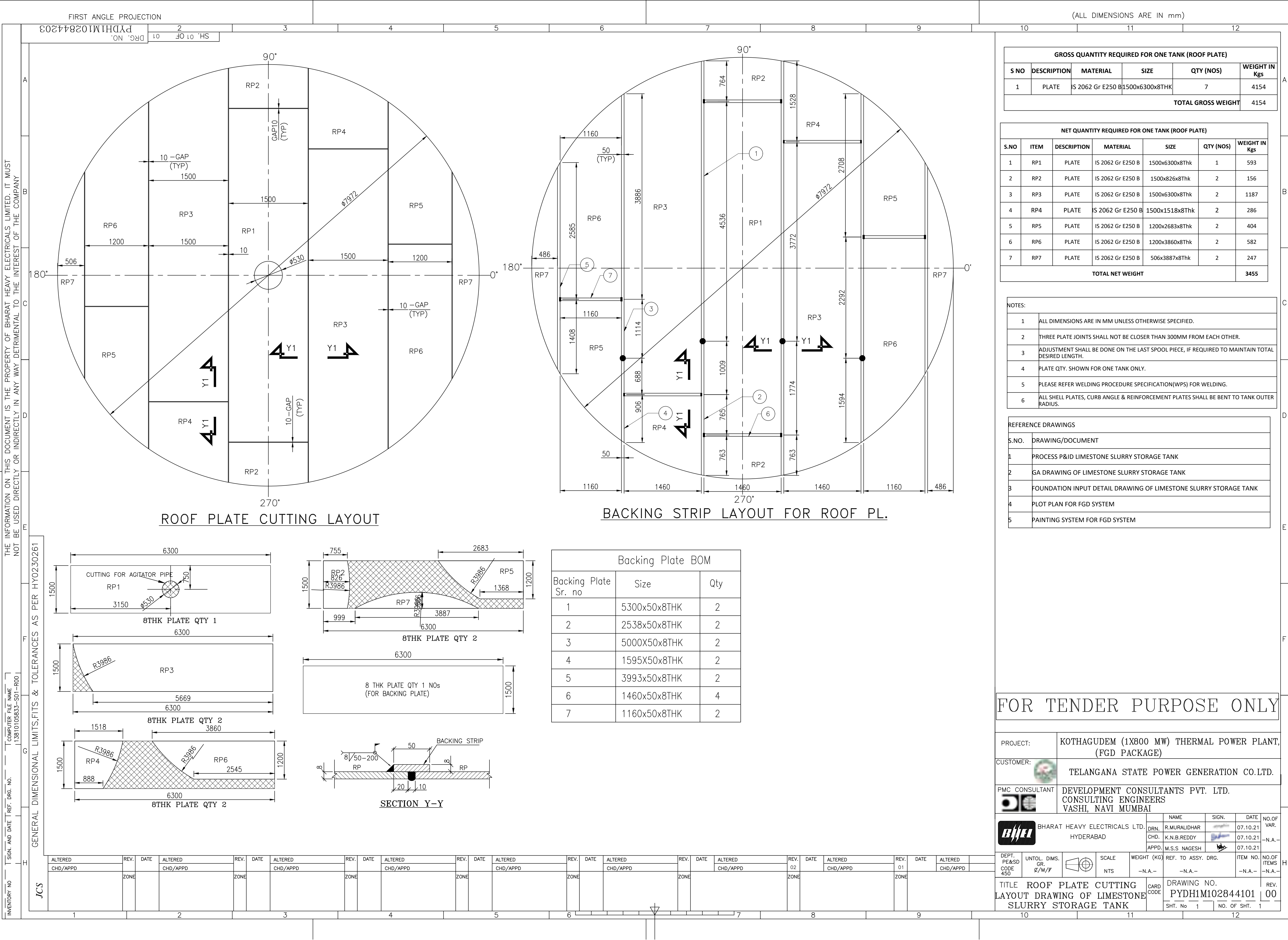
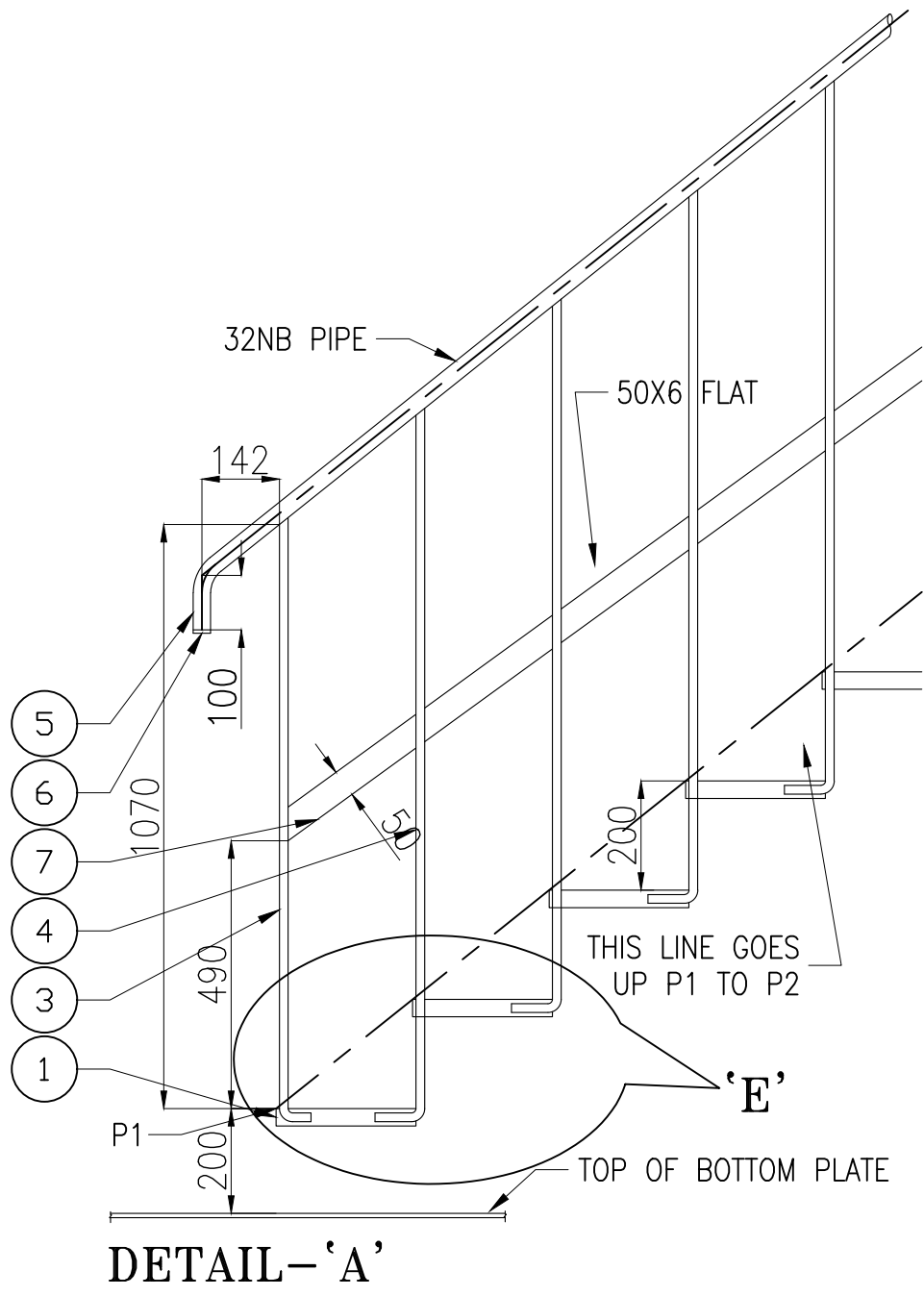


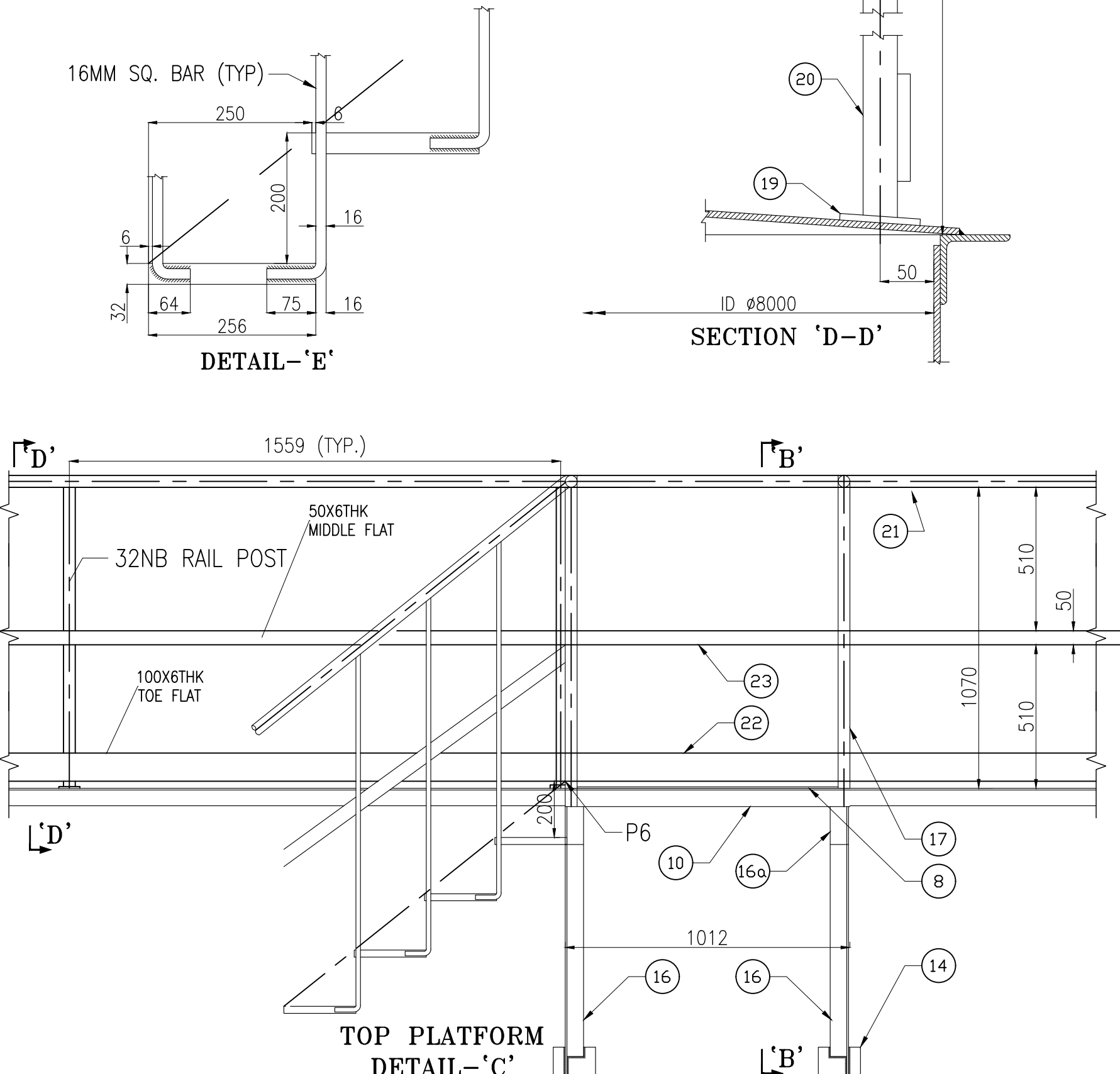
PLATE-B2-QTY-01Nos
(SIZE-1500X6300)
(QTY-01 NOS)

[illegible]





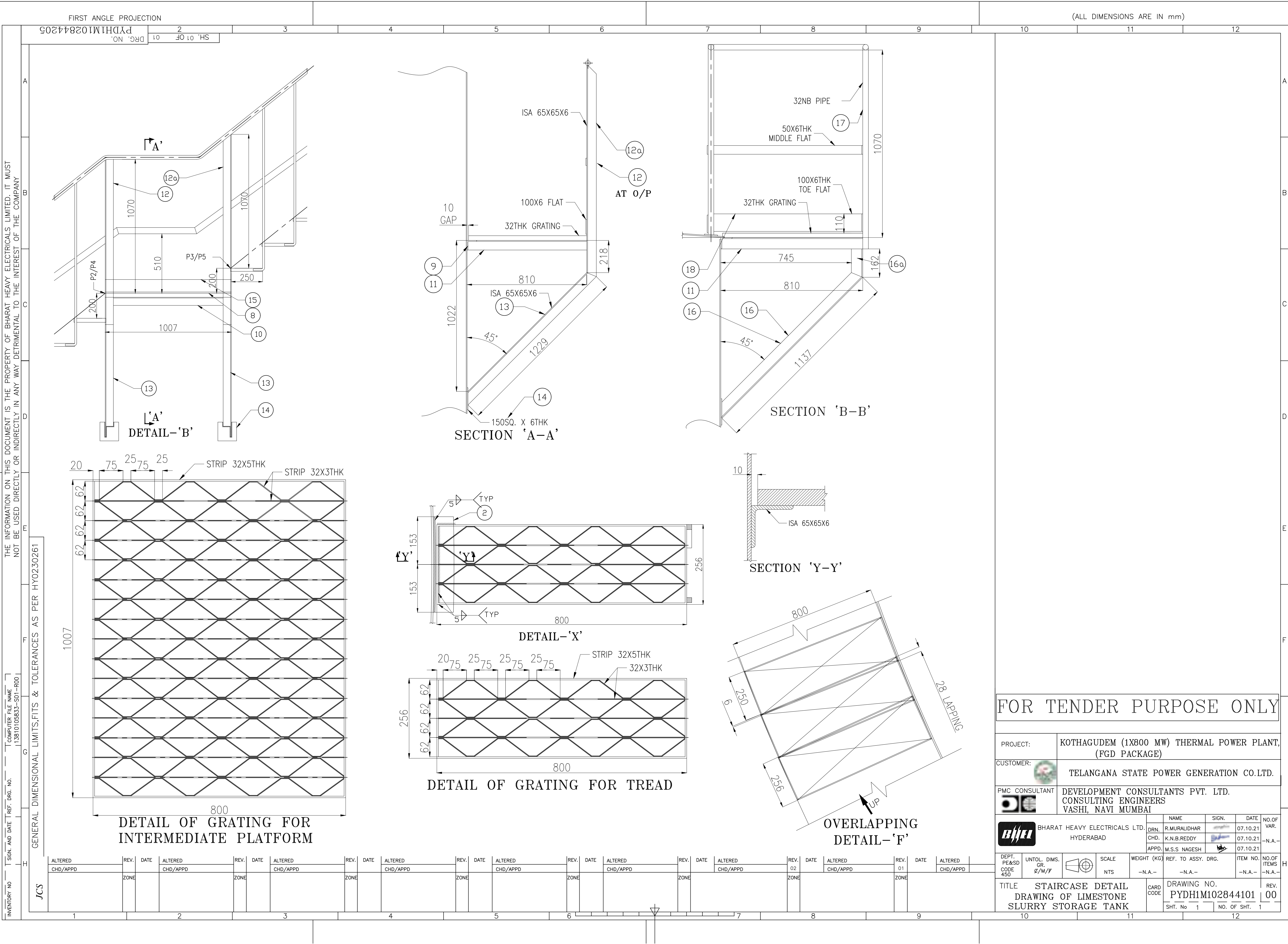
STAIRCASE DETAILS OF LIMESTONE SLURRY STORAGE TANK

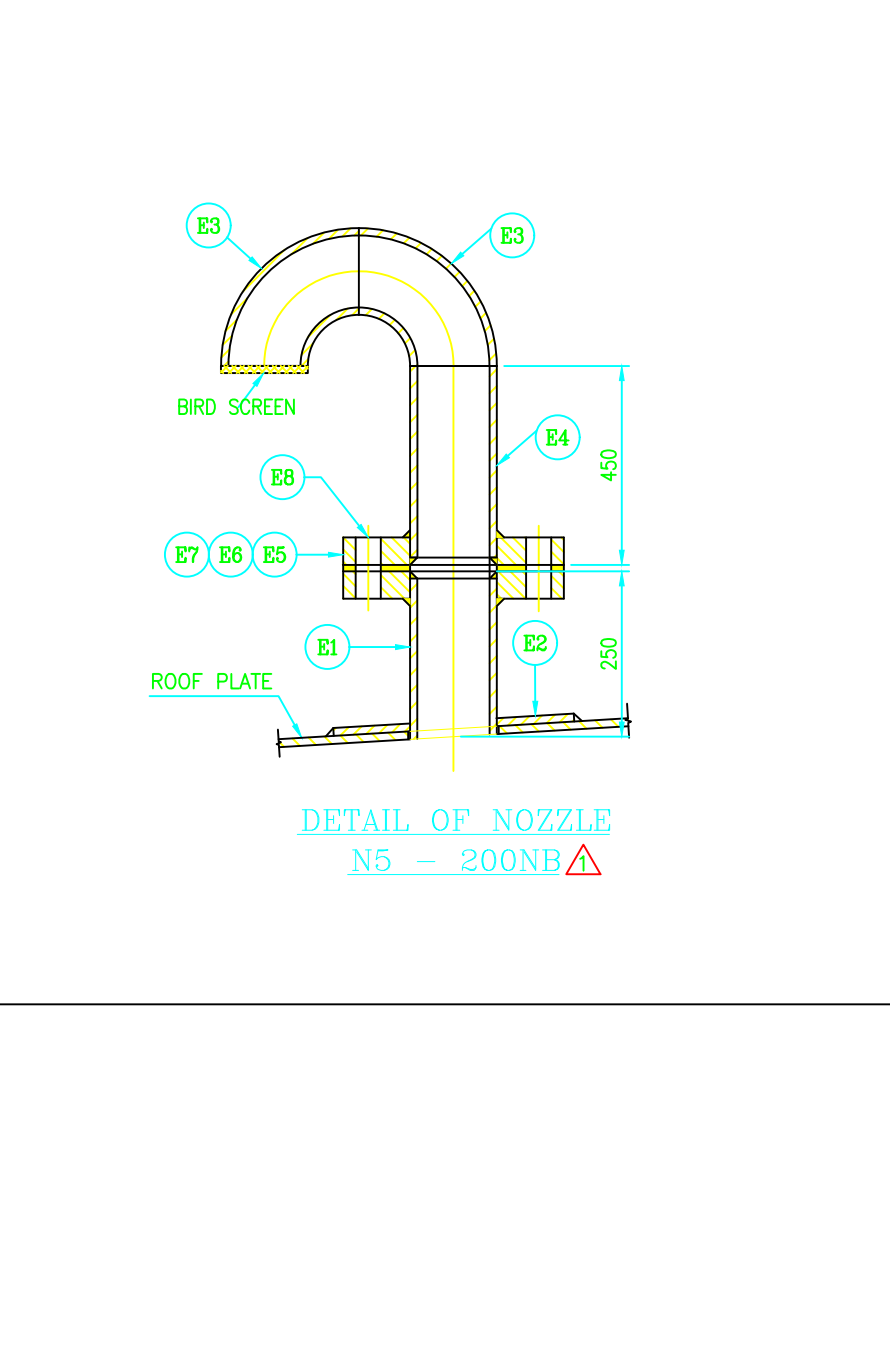
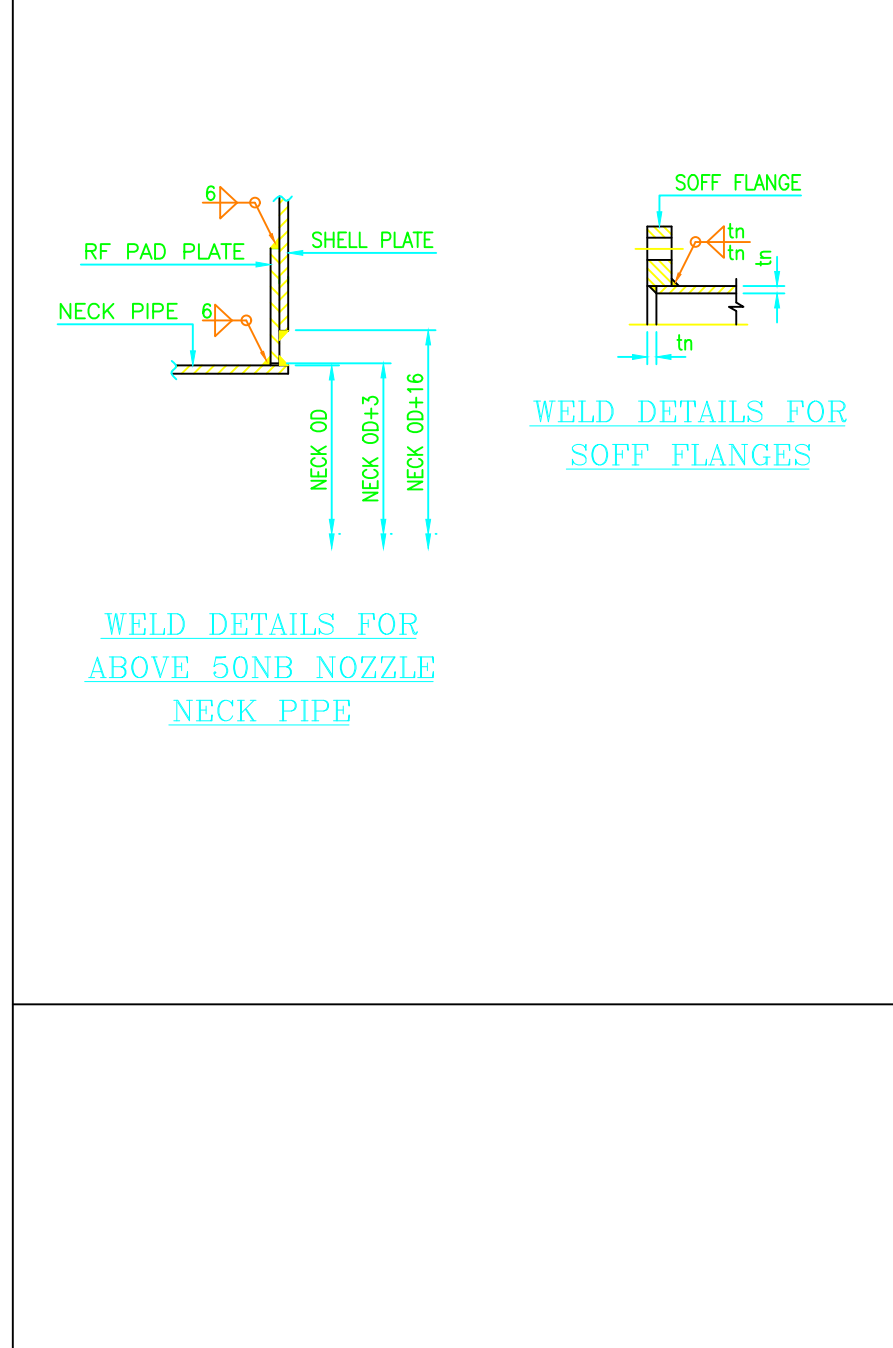
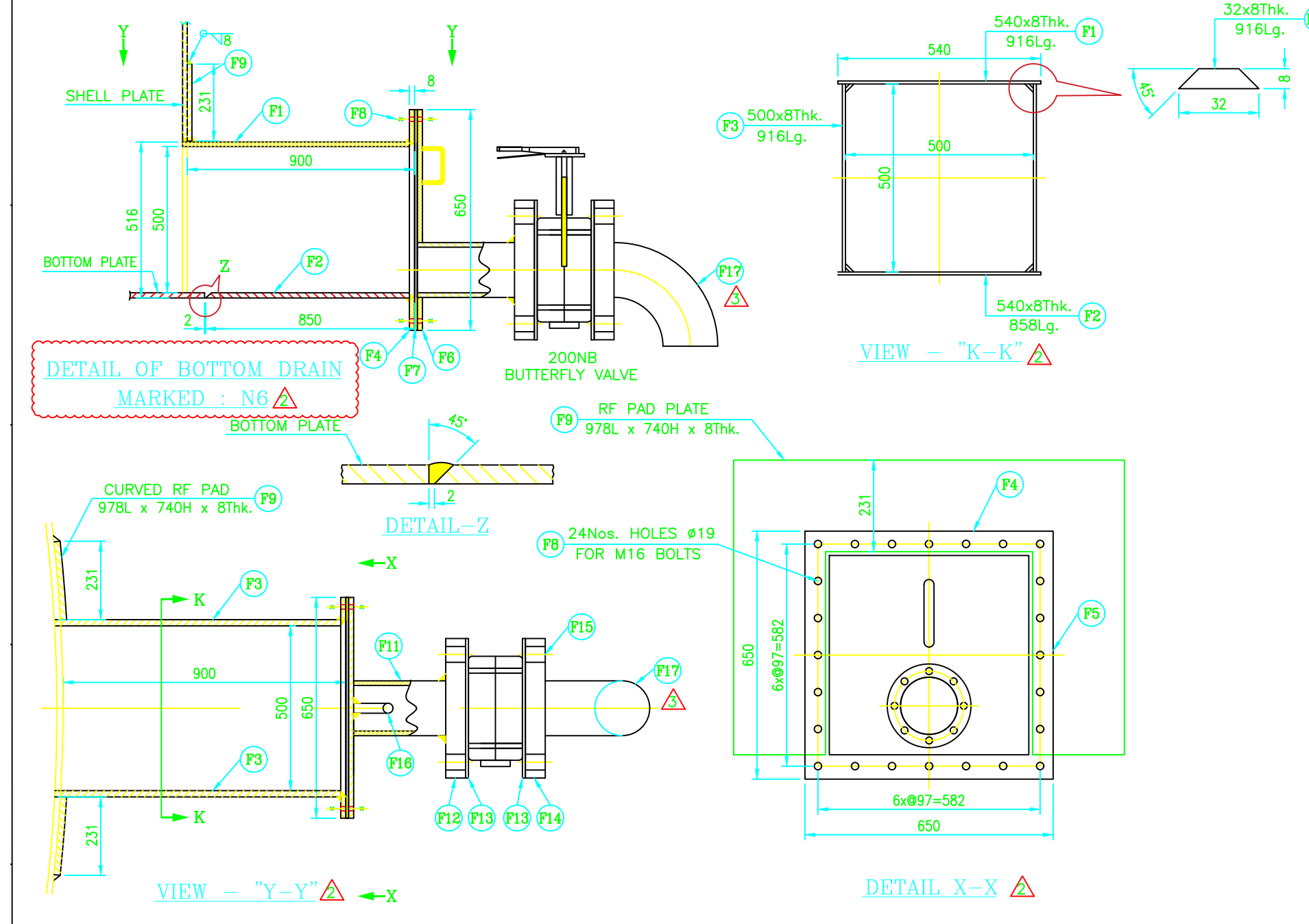


BILL OF MATERIAL FOR ONE TANK								
TAG	S.NO.	DESCRIPTION	MATERIAL	SIZE	LENGTH(M)	QTY (NOS)	UNIT WEIGHT IN Kgs	NET WEIGHT IN Kgs
STAIRCASE	1	STAIR TREAD	IS 2062, Gr E250, A	As per Drawing		45		
	2	Tread Support	IS 2062, Gr E250, A	ISA 65X65X6	306	45	1.7748	79.866
	3	Tread Post Bar	IS 2062, Gr E250, A	ISSQ 16	1135	1	2.280896	2.280896
	4	Tread Post Bar	IS 2062, Gr E250, A	ISSQ 16	1350	45	2.71296	122.0832
	5	Handrail Railing of Staircase	IS 1239, PART 1 MEDIUM	32 NB	15000	1	46.5	46.5
	6	Dummy Plate	IS 2062, Gr E250, B	Ø 40 X 6THK	1	2	0.059187606	0.118375211
	7	Middle Flat	IS 2062, Gr E250, A	IS FLAT-50X6THK	15000	1	35.325	35.325
	8	PLATFORM	IS 2062, Gr E250, A	As per Drawing		2		
	9	Tread Support	IS 2062, Gr E250, A	ISA 65X65X6	1057	2	6.1306	12.2612
	10	Support Frame	IS 2062, Gr E250, A	ISA 65X65X6	1000	3	5.8	17.4
	11	Support Frame	IS 2062, Gr E250, A	ISA 65X65X6	810	4	4.698	18.792
	12	Support Angle	IS 2062, Gr E250, A	ISA 65X65X6	1320	1	7.656	7.656
	13	Support Angle	IS 2062, Gr E250, A	ISA 65X65X6	1229	2	7.1282	14.2564
	14	Pad Plate	IS 2062, Gr E250, B	150X8	150	8	1.413	11.304
	15	Toe Plate	IS 2062, Gr E250, B	100X8	1000	3	0.628	1.884
	16	Support Angle	IS 2062, Gr E250, A	ISA 65X65X6	1137	2	6.5946	13.1892
	17	Handrail Rail. Post	IS 1239, PART 1 MEDIUM	32 NB	1100	2	3.1	6.2
	18	Toe Flat for Platform	IS 2062, Gr E250, A	100X6	850	2	0.471	0.942
	19	Pad Plate	IS 2062, Gr E250, B	75X8	75	20	0.35325	7.065
ROOF HANDRAIL	20	Roof Rail Post	IS 1239, PART 1 MEDIUM	32 NB	1057	20	3.2767	65.534
	21	Roof Hand Rail	IS 1239, PART 1 MEDIUM	32 NB	26000	1	80.6	80.6
	22	Toe Flat	IS 2062, Gr E250, A	IS FLAT-100X6THK	26000	1	4.71	122.46
	23	Middle Flat	IS 2062, Gr E250, A	IS FLAT-50X6THK	26000	1	2.36	61.36
TOTAL NET WEIGHT								727

FOR TENDER PURPOSE ONLY

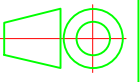
PROJECT:		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)									
CUSTOMER:		 TELANGANA STATE POWER GENERATION CO.LTD.									
PMC CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI									
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD				NAME	SIGN.	DATE	NO.OF VAR.				
		DRN.	R.MURALIDHAR			07.10.21	-N.A.-				
		CHD.	K.N.B.REDDY			07.10.21	-N.A.-				
		APPD.	M.S.S NAGESH			07.10.21	-N.A.-				
DEPT. PE&SD CODE 450	UNTOL. DIMS. GR. 2/M/17		SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-			ITEM NO. -N.A.-	NO.OF ITEMS -N.A.-		
TITLE STAIRCASE DETAIL DRAWING OF LIMESTONE SLURRY STORAGE TANK				CARD CODE	DRAWING NO. PYDH1M102844101				REV. 00		
				SHT. NO 1		NO. OF SHT. 1					

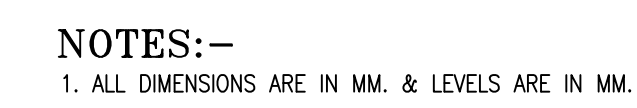




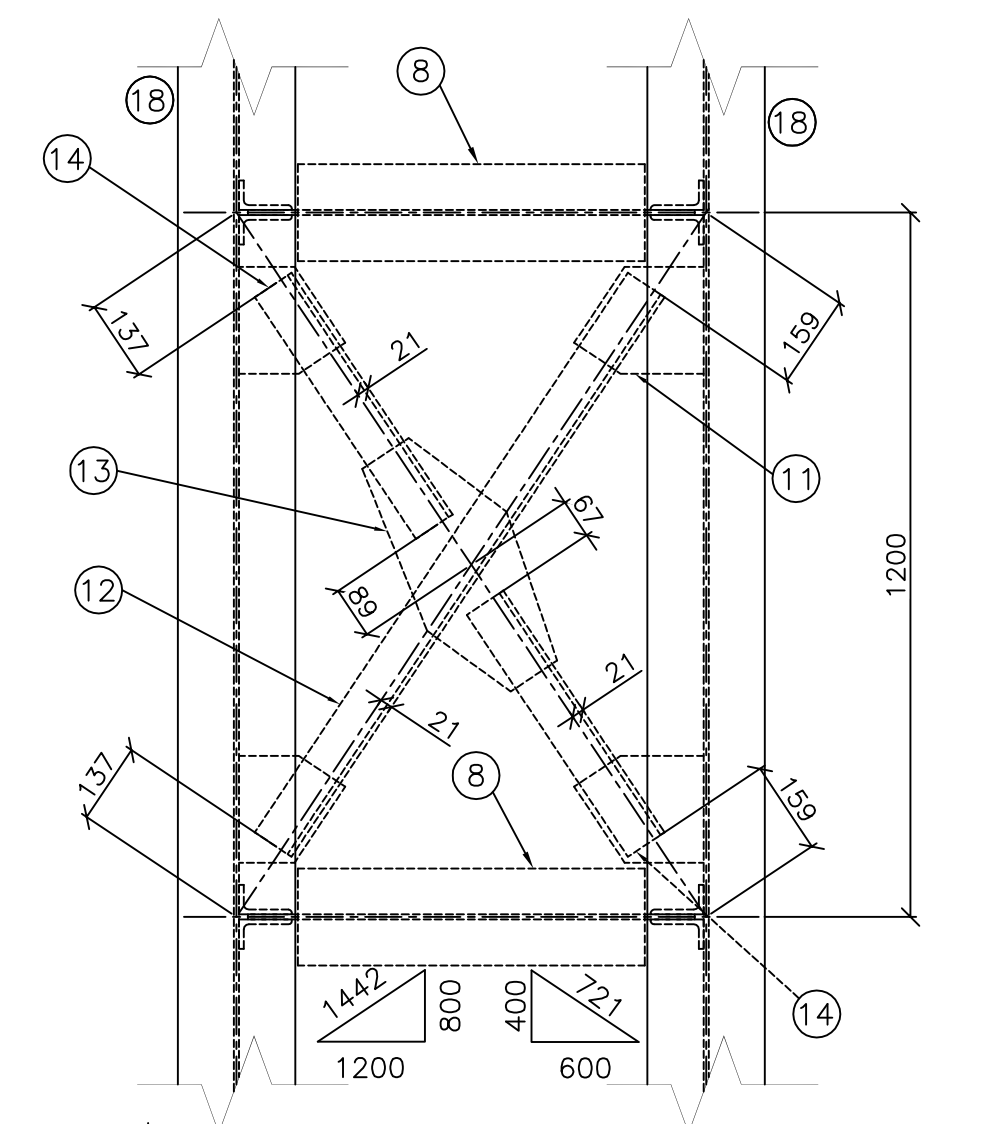
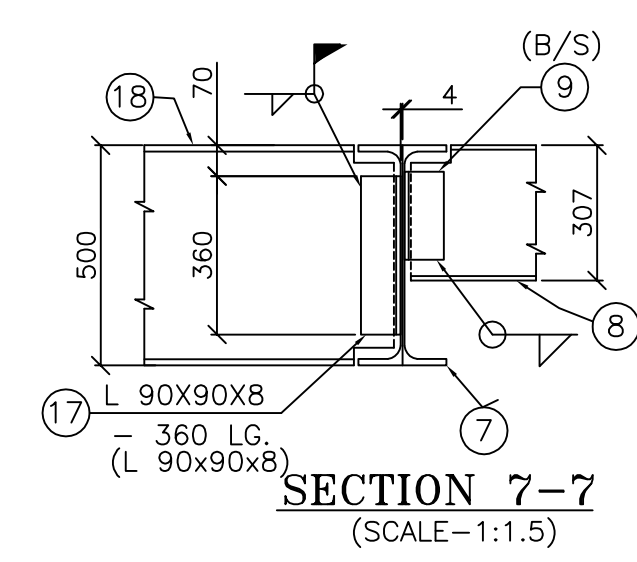
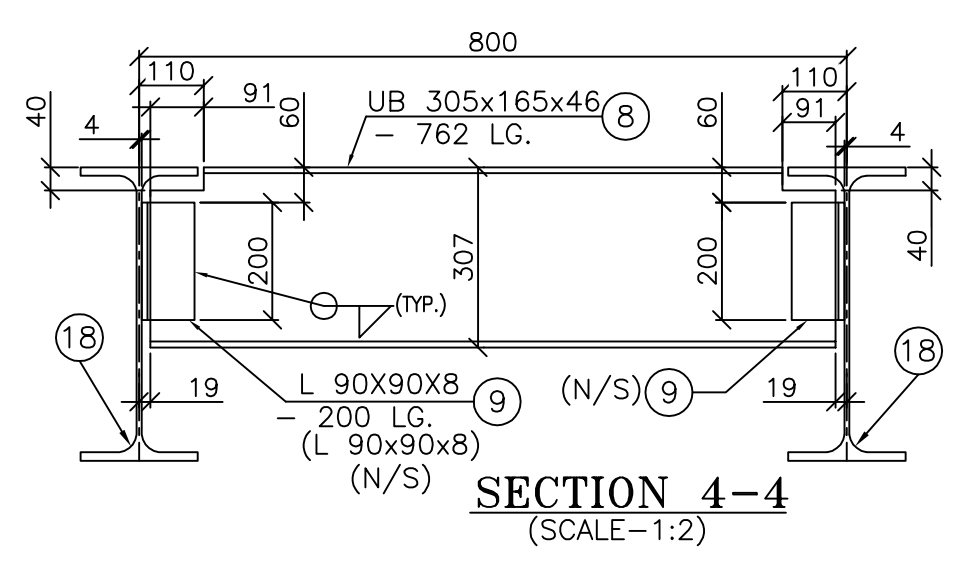
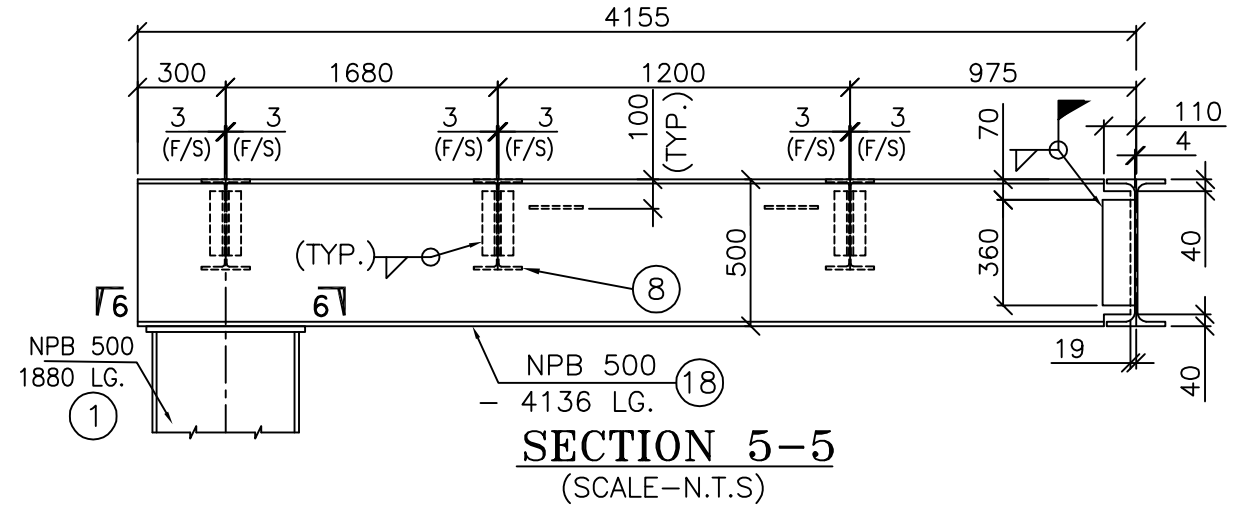
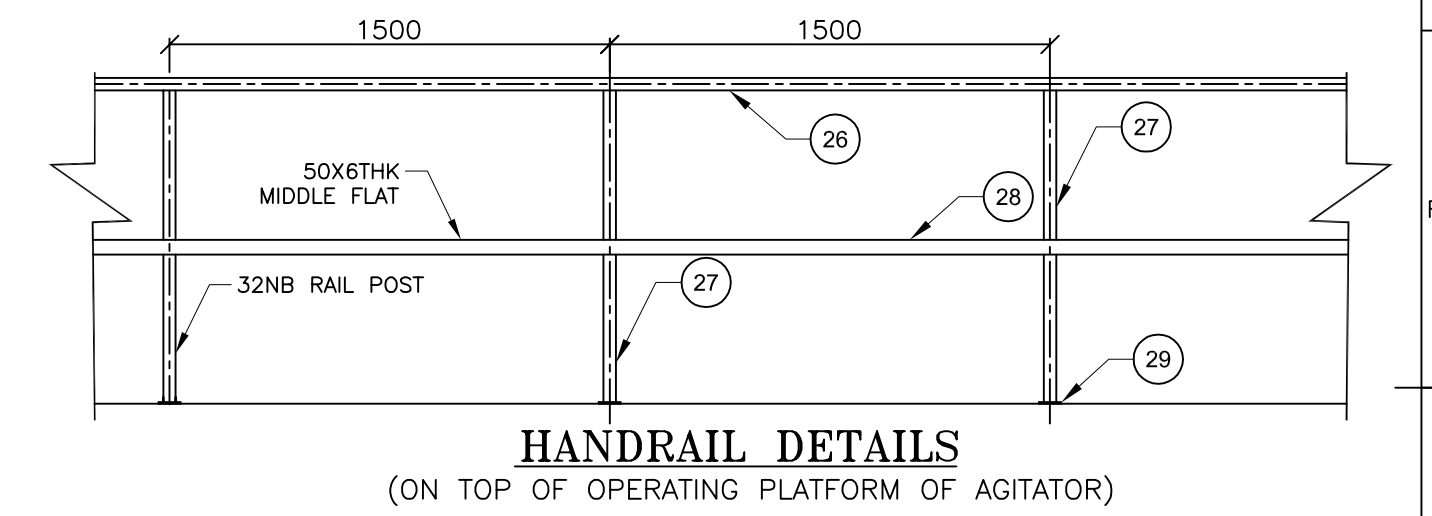
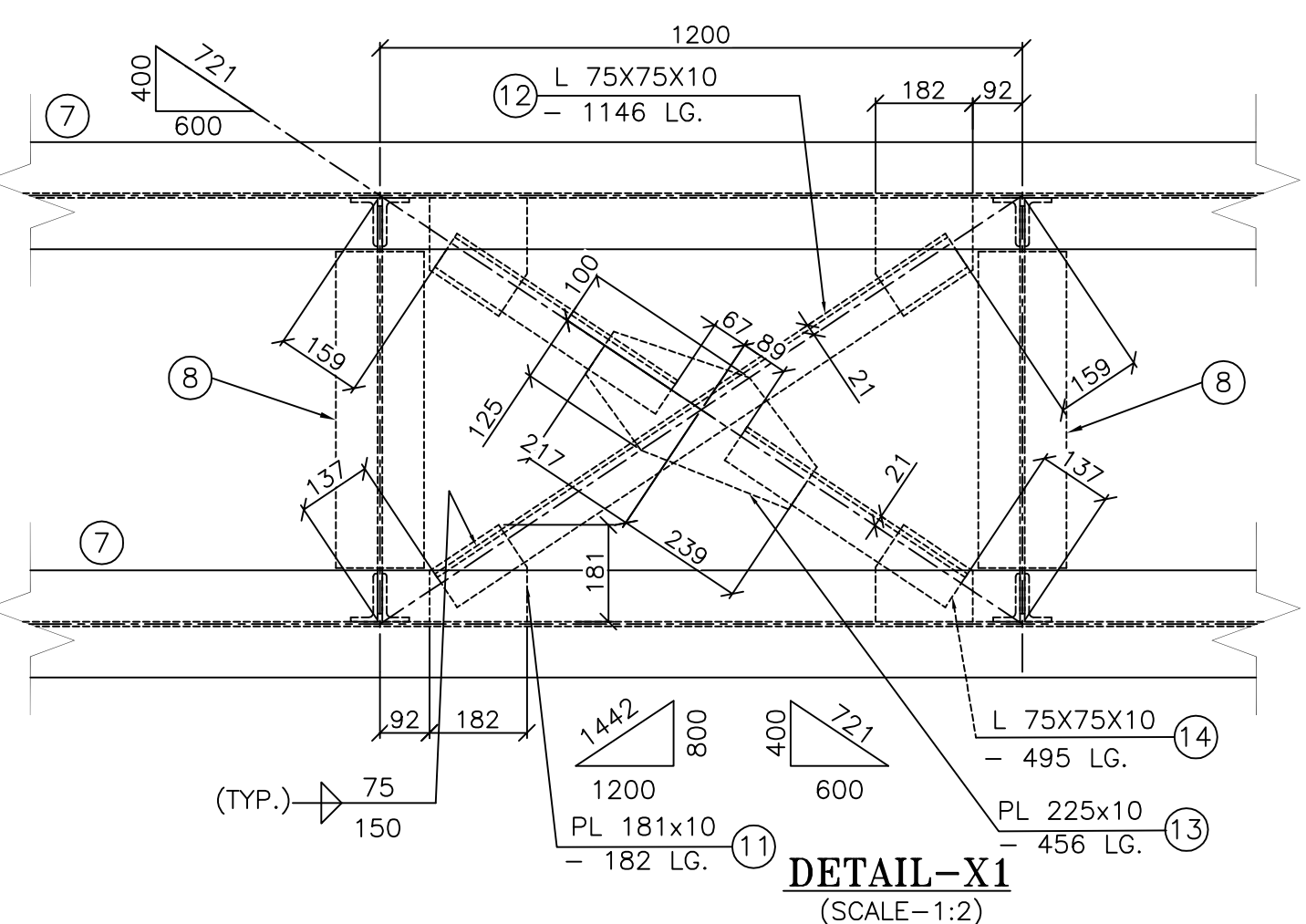
BOM OF MATERIAL FOR LINE STONE SUFFY STORAGE TANK											
MARKED NO.	SL NO.	DESCRIPTION	MATERIAL	SIZE	LENGTH (mm)	QTY	UNIT WEIGHT	TOTAL WEIGHT(Kgs)			
N1 A/B - TANK PUMP SUCTION LINE - 125NB	A1	NECK PIPE	5 1239, PART-1 HEAVY	25NB x 5.4THK	400	2	7.6	15.2			
	A2	RF PAD PLATE	5 2062, GR E 250, BR	DD 400 x ID 144 x 8THK.		2	9.9	13.8			
	A3	FLANGE	5 2062, GR E 250, BR	25NB R150 SOFF		2	6.8	13.6			
	A4	GASKET	NEOPRENE GASKET	DD 255 x ID 144 x 3THK.		2	-	-			
	A5	COUNTER FLANGE	5 2062, GR E 250, BR	25NB R150 SOFF		2	6.8	13.6			
	A6	DIFFUSER	ASTM A234 WPB	25NB x 150NB - Sch.40		2	3.9	7.8			
	A7	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 5.4THK		16	0.35	5.6			
	A8	NECK PIPE	5 1239, PART-1 HEAVY	20NB x 5.4THK	400	1	6.8	6.8			
	B2	RF PAD PLATE	5 2062, GR E 250, BR	DD 305 x ID 117 x 8THK.		1	3.9	3.9			
	B3	FLANGE	5 2062, GR E 250, BR	100NB R150 SOFF		1	9.9	9.9			
N2 - MINIMUM FLOW LINE - 100NB	B4	GASKET	NEOPRENE GASKET	DD 230 x ID 117 x 3THK.		1	-	-			
	B5	COUNTER FLANGE	5 2062, GR E 250, BR	100NB R150 SOFF		1	5.9	5.9			
	B6	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M16 x 90Lg.		8	0.2	1.6			
	C1	NECK PIPE	5 3589, GR Fe 410, ERW	200NB x 6.3THK	400	2	13.31	26.6			
	C2	RF PAD PLATE	5 2062, GR E 250, BR	DD 485 x ID 222 x 6THK.		2	5.9	13.8			
	C3	FLANGE	5 2062, GR E 250, BR	100NB R150 SOFF		2	13.7	27.4			
	C4	GASKET	NEOPRENE GASKET	DD 345 x ID 222 x 3THK.		2	-	-			
	C5	COUNTER FLANGE	5 2062, GR E 250, BR	100NB R150 SOFF		2	13.7	27.4			
	C6	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 110Lg.		16	0.4	6.2			
	D1A	NECK PIPE	5 3589, GR Fe 410, ERW	200NB x 6.3THK	430	1	13.571	13.6			
N3 A/B - LIQUID INLET LINE - 200NB	D1A	NECK PIPE	5 3589, GR Fe 410, ERW	200NB x 6.3THK	614	1	20.9854	21.0			
	D2	RF PAD PLATE	5 2062, GR E 250, BR	DD 485 x ID 222 x 6THK.		1	6.9	6.9			
	D3	FLANGE	5 2062, GR E 250, BR	100NB R150 SOFF		1	13.7	13.7			
	D4	GASKET	NEOPRENE GASKET	DD 345 x ID 222 x 3THK.		1	-	-			
	D5	COUNTER FLANGE	5 2062, GR E 250, BR	100NB R150 SOFF		1	13.7	13.7			
	D6	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 110Lg.		8	0.4	3.1			
	D7	PIPE	5 3589, GR Fe 410, ERW	200NB x 6.3THK	8530	1	283.8784	283.9			
	D8	ELBOW	ASTM A234 WPB	200NB, 90DEG LR, B/W, Sch.40		1	20.3	20.3			
	D9	PAD PLATE	5 2062, GR E 250, BR	500 x 150 x 6THK.		12	0.05975	0.72			
	D10	SMC 100	5 2062, GR E 250, A	400 Lg.		6	9.2	77.3			
N4 - OVERFLOW LINE - 200NB	D11	SMC 75	5 2062, GR E 250, A	800 Lg.		6	6.8	40.8			
	D12	PAD PLATE FOR PIPE	5 2062, GR E 250, BR	200 x 200 x 8THK.		6	2.51	15.1			
	D13	BASE PLATE ON PIPE	5 2062, GR E 250, BR	150 x 150 x 8THK.		6	1.41	8.5			
	D14	STIFFENERS	5 2062, GR E 250, BR	140 x 140 x 8THK.		12	1.23088	14.8			
	D15	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 50Lg.		6	0.2	1.3			
	E1	NECK PIPE	5 3589, GR Fe 410, ERW	200NB x 6.3THK	250	1	6.32	6.32			
	E2	RF PAD PLATE	5 2062, GR E 250, BR	DD 485 x ID 222 x 8THK.		1	12.7	12.7			
	E3	FLOW	ASTM A234 WPB	200NB, 90DEG Sch.40 LR, B/W		2	20.3	40.6			
	E4	SPPOOL PIPE	5 3589, GR Fe 410, ERW	200NB x 6.3THK	450	1	14.976	15.0			
	E5	FLANGE	5 2062 GR E250 BR	100NB R150 SOFF		1	13.7	13.7			
N5 - VENT WITH GOOSE NECK - 200NB	E6	GASKET	NEOPRENE GASKET	DD 345 x ID 222 x 3THK.		1	-	0.0			
	E7	COUNTER FLANGE	5 2062 GR E250 BR	100NB R150 SOFF		1	13.7	13.7			
	E8	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 110Lg.		8	0.3875	3.1			
	F1	TOP PLATE	5 2062 GR E250 BR	540 x 916 x 8THK.		1	31.1	31.1			
	F2	BOTTOM PLATE	5 2062 GR E250 BR	540 x 858 x 8THK.		1	29.10	29.1			
	F3	SIDE PLATE	5 2062 GR E250 BR	500 x 916 x 8THK.		2	28.8	57.5			
	F4	FLANGE PLATE-1	5 2062 GR E250 BR	550 x 67 x 8THK.		2	2.7	5.5			
	F5	FLANGE PLATE-2	5 2062 GR E250 BR	550 x 67 x 8THK.		2	2.7	5.5			
	F6	COVER PLATE	5 2062 GR E250 BR	550 x 450 x 8THK.		1	26.5	26.5			
	F7	GASKET	NEOPRENE GASKET	DD 616 x ID 516 x 3THK.		1	-	0.0			
N6 - DRAIN LINE - 200NB	F8	BOLTS & NUTS	5 1367 CL 4.6	M10 x 60Lg.		24	0.2	4.8			
	F9	RF PAD PLATE	5 2062 GR E250 BR	778 x 740 x 8THK.		1	28.1	28.1			
	F10	STIFFENER PLATE	5 2062 GR E250 BR	82 x 916 x 8THK.		4	1.84	7.4			
	F11	PIPE	5 3589, GR Fe 410, ERW	200NB x 6.3THK	200	1	6.66	6.7			
	F12	FLANGE	5 2062 GR E250 BR	100NB R150 SOFF		1	13.7	13.7			
	F13	GASKET	NEOPRENE GASKET	DD 345 x ID 222 x 3THK.		2	-	0.0			
	F14	COUNTER FLANGE	5 2062 GR E250 BR	100NB R150 SOFF		1	13.7	13.7			
	F15	STUD BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 180Lg.		8	0.6	4.8			
	F16	HINGE ROD	5 2062 GR E250 A	SRO 16		300	1	0.47	0.5		
	F17	ELBOW	ASTM A234 WPB	200NB, 90DEG Sch.STD, LR, B/W		1	16.57	16.6			
N7 - SPARE INLET - 150NB	G1	NECK PIPE	5 1239, PART-1 HEAVY	25NB x 5.4THK	400	1	6.8	6.8			
	G2	RF PAD PLATE	5 2062, GR E 250, BR	DD 400 x ID 171 x 8THK.		1	5.5	5.5			
	G3	FLANGE	5 2062, GR E 250, BR	150NB R150 SOFF		1	8.6	8.6			
	G4	GASKET	NEOPRENE GASKET	DD 280 x ID 171 x 3THK.		1	-	-			
	G5	BLIND FLANGE	5 2062, GR E 250, BR	150NB R150 BLFF		1	11.8	11.8			
	G6	DIFFUSER	ASTM A234 WPB	150NB x 200NB - Sch.40		1	6.5	6.5			
	G7	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg.		8	0.4	2.9			
	H1	NECK PIPE	5 1239, PART-1 HEAVY	25NB x 5.4THK	400	1	6.8	6.8			
	H2	RF PAD PLATE	5 2062, GR E 250, BR	DD 400 x ID 171 x 8THK.		1	5.5	5.5			
	H3	FLANGE	5 2062, GR E 250, BR	150NB R150 SOFF		1	8.6	8.6			
N8 - SPARE INLET - 150NB	H4	GASKET	NEOPRENE GASKET	DD 280 x ID 171 x 3THK.		1	-	-			
	H5	BLIND FLANGE	5 2062, GR E 250, BR	150NB R150 BLFF		1	11.8	11.8			
	H6	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg.		8	0.35	3.3			
	I1	NECK PIPE	5 1239, PART-1 HEAVY	20NB x 5.4THK	300	1	3.5	3.5			
	I2	RF PAD PLATE	5 2062, GR E 250, BR	DD 305 x ID 117 x 8THK.		1	3.9	3.9			
	I3	FLANGE	5 2062, GR E 250, BR	100NB R150 SOFF		1	5.9	5.9			
	I4	GASKET	NEOPRENE GASKET	DD 230 x ID 117 x 3THK.		1	-	-			
	I5	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M16 x 90Lg.		8	0.2	1.6			
	J1	NECK PIPE	5 2062, GR E 250, BR	2369 x 200 x 8THK.		1	29.8	29.8			
	J2	RF PAD PLATE	5 2062, GR E 250, BR	DD 1545 x ID 765 x 8THK.		1	88.9	88.9			
M1 - SHELL MANHOLE - 750NB	J3	GASKET	NEOPRENE GASKET	DD 984 x ID 762 x 3THK.		1	-	-			
	J4	COVER PLATE	5 2062, GR E 250, BR	DIA 984 x 16THK.		1	95.50	95.5			
	I5	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M20 x 60Lg.		42	0.25	10.5			
	J6	HANDLE	5 2062, GR E 250, A	SRO 16		300	2	0.47344166	0.9		
	J7	FLANGE PLATE	5 2062, GR E 250, BR	DD 984 x ID 762 x 14THK.		1	32.45	32.5			
	K1	NECK PLATE	5 2062, GR E 250, BR	904 x 210 x 6THK.		1	18.8	18.8			
	K2	FLANGE PLATE	5 2062, GR E 250, BR	DD 762 x ID 615 x 6THK.		1	7.49	7.5			
	K3	GASKET	NEOPRENE GASKET	DD 762 x ID 615 x 3THK.		1	-	0.0			
	K4	COVER PLATE	5 2062, GR E 250, BR	DIA 762 x 6THK.		1	21.48	21.48			
	K5	BOLTS & NUTS	5 1367 CL 4.6 / 4.0 GALV	M16 x 60Lg.		20	0.15	3.0			
K6	HANDLE	5 2062, GR E 250, A	SRO 16		300	2	0.47344166	0.9			
K7	RF PAD PLATE	5 2062, GR E 250, BR	DD 1150 x ID 625 x 6THK.		1	34.7	34.7				
TOTAL WEIGHT IN KGS									245.7	245.7	
FOR TENDER PURPOSE ONLY											

FOR TENDER PURPOSE ONLY 1537.7

PROJECT:		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)					
CUSTOMER:		 TELANGANA STATE POWER GENERATION CO. LTD.					
PMC CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI					
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN. R.MURALIDHAR CHD. K.N.B.REDDY APP. M.S.S. NAGESH	NAME SIGN.	DATE 07.10.21 07.10.21 07.10.21	NO.OF VAR. —N.A.— —N.A.— —N.A.—		
DEPT. PE&SD CODE 450	UNTOL. DIMS. GR. Ø/M/F		SCALE NTS	WEIGHT (KG) —N.A.—	REF. TO ASSY. DRG. —N.A.—	ITEM NO. —N.A.—	NO.OF ITEMS —N.A.—
TITLENOLZZLE DETAIL DRAWING LIMESTONE SLURRY STORAGE TANK				CARD CODE PYDHIM102844101	DRAWING NO. PYDHIM102844101 SHT. No. 1 NO. OF SHT. 1		REV. 00



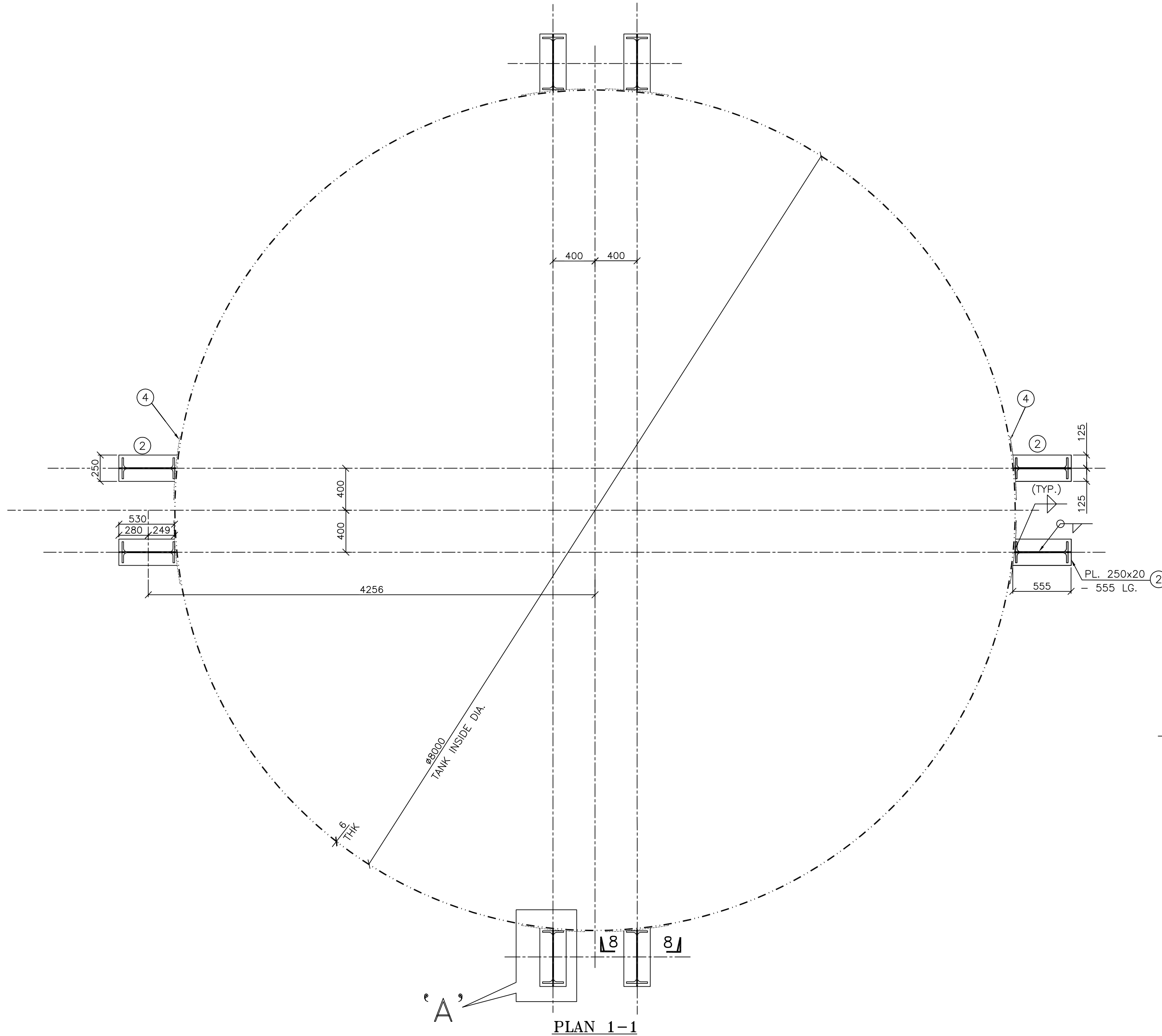
ITEM NO.	SECTION		MATERIAL	LENGTH	WIDTH	THICK.	Qty FOR ONE ASSEMBLY	UNIT WT. (Kgs.)	WEIGHT FOR ONE ASSEMBLY (Kgs.)
1	Beam- NPB 500X200	NPB 500X200	IS 2062, Gr E250, A	1880			8	90.68	1363.83
1A	PLATE	1500X6300X10	IS 2062, Gr E250, B	1450	25	10	8	2.85	22.77
2	PLATE	1500X6300X20	IS 2062, Gr E250, B	555	250	20	8	21.78	174.27
3	PLATE	1500X6300X10	IS 2062, Gr E250, B	549	180	10	8	7.76	62.06
4	PLATE	1500X6300X10	IS 2062, Gr E250, B	1700	600	10	8	80.07	640.56
6	PLATE	1500X6300X20	IS 2062, Gr E250, B	550	250	20	8	21.59	172.70
7	Beam- NPB 500X200	NPB 500X200	IS 2062, Gr E250, A	9105	--	--	2	90.68	1651.28
8	UB 305x165x46	UB 305X165X46	IS 2062, Gr E250, A	762	--	--	14	46.10	491.79
9	ANGLE- L 90x90x8	ISA 90X90X8	IS 2062, Gr E250, A	200	--	--	56	10.80	120.96
10	PLATE OD500 X ID323	1500X6300X10	IS 2062, Gr E250, B	726	--	10	1	31.56	22.91
11	PLATE	1500X6300X10	IS 2062, Gr E250, B	182	181	10	16	2.59	41.38
12	ANGLE 75x75x10	ISA 75X75X10	IS 2062, Gr E250, A	1146	--	--	4	11.00	50.42
13	PLATE	1500X6300X10	IS 2062, Gr E250, B	456	225	10	4	8.05	32.22
14	ANGLE 75x75x10	ISA 75X75X10	IS 2062, Gr E250, A	495	--	--	8	11.00	43.56
15	PLATE	1500X6300X32	IS 2062, Gr E250, B	850	850	32	2	181.49	362.98
16	CHQD.PL.820X60I/P		IS 2062, Gr E250, B	4109	820	6 O/P	2	53.20	358.50
17	ANGLE- L 90x90x8	ISA 90X90X8	IS 2062, Gr E250, A	360	--	--	8	10.80	31.10
18	Beam- NPB 500X200	NPB 500X200	IS 2062, Gr E250, A	4050	--	--	4	90.68	1469.02
20	CHQD.PL.820X60I/P		IS 2062, Gr E250, B	4109	820	6 O/P	2	53.20	358.50
21	PIPE ERW 550X10	PIPE ERW 550X10	IS 3589	984			1	133.17	131.04
25	FLAT 50 x 6THK	IS FLAT-50X6THK	IS 2062, Gr E250, B	590	50	6	8	1.39	11.12
26	Roof Hand Rail 32NB GI	32 NB GI PIPE(MEDIUM)	IS 1239, PART 1 MEDIUM	36000	--	--	1	111.60	111.60
27	Roof Hand Rail 32NB GI	32 NB GI PIPE(MEDIUM)	IS 1239, PART 1 MEDIUM	1100	--	--	26	3.41	88.66
28	Middle FLAT 50 X 6THK	IS FLAT-50X6THK	IS 2062, Gr E250, A	36000	50	6	1	84.78	84.78
29	PAD PLATE	1500X6300X8	IS 2062, Gr E250, B	75	75	8	24	0.35	8.48
								Total (Kgs)	7906.49



~~DETAIL X~~ ~~(SHEET #2)~~	
FOR TENDER	PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT (FGD PACKAGE)									
CUSTOMER:		TELANGANA STATE POWER GENERATION CO.LTD.								
PMC CONSULTANT		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI								
	BHARAT HEAVY ELECTRICALS LTD. HYDERABAD									
DEPT. PEASE CODE	UNTOOL OR C/M/F	DIMS. C/M/F		SCALE NTS	WEIGHT (KG)	REF. TO ASSY. DRG.	N.A.M.	N.A.M.	N.A.M.	N.A.M.
TITLE AGITATOR & ROOF STRUCTURE ARRANGEMENT OF LIMESTONE SLURRY STORAGE TANK						DRAWING NO. PYDH1M102844101				REV. 00
CARD CODE						SHT. No 1				NO. OF SHT. 1

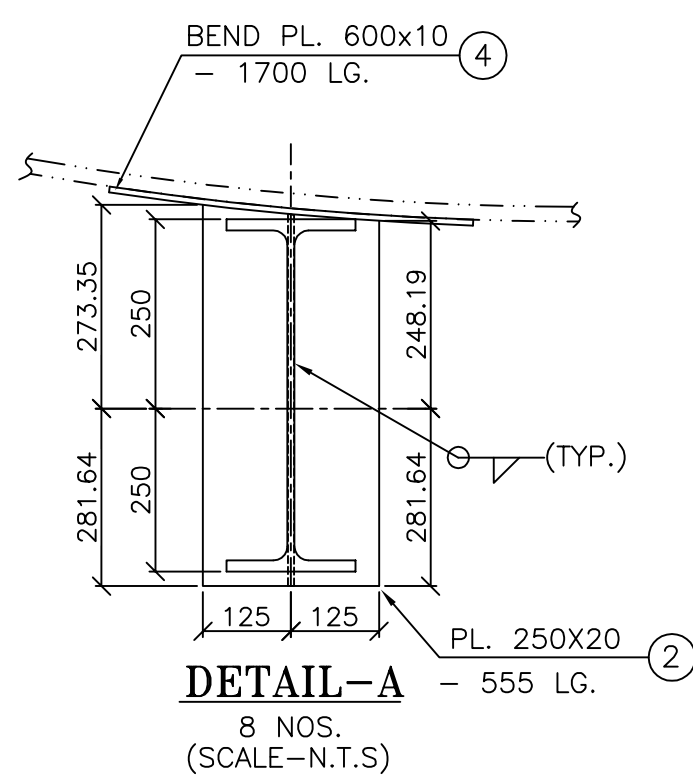
INVENTORY NO	SIGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
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PLAN 1-1

NOTES:-
1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN MM

TITLE AGITATOR & ROOF STRUCTURE ARRANGEMENT OF LIMESTONE SLURRY STORAGE TANK	CARD CODE	CARD CODE	DRAWING NO.	REV.
			PYDH1M102844101	00
		SHT. No. 1	NO. OF SHT. 1	



DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	R.MURALIDHAR
	CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD		01.15.02.21	CHD/APPD	K.N.B REDDY
			ZONE			ZONE			ZONE			ZONE			ZONE				ZONE	DIMENSIONS OF RAFTERS ARE UPDATED
7			2			9			10			11			12				13	

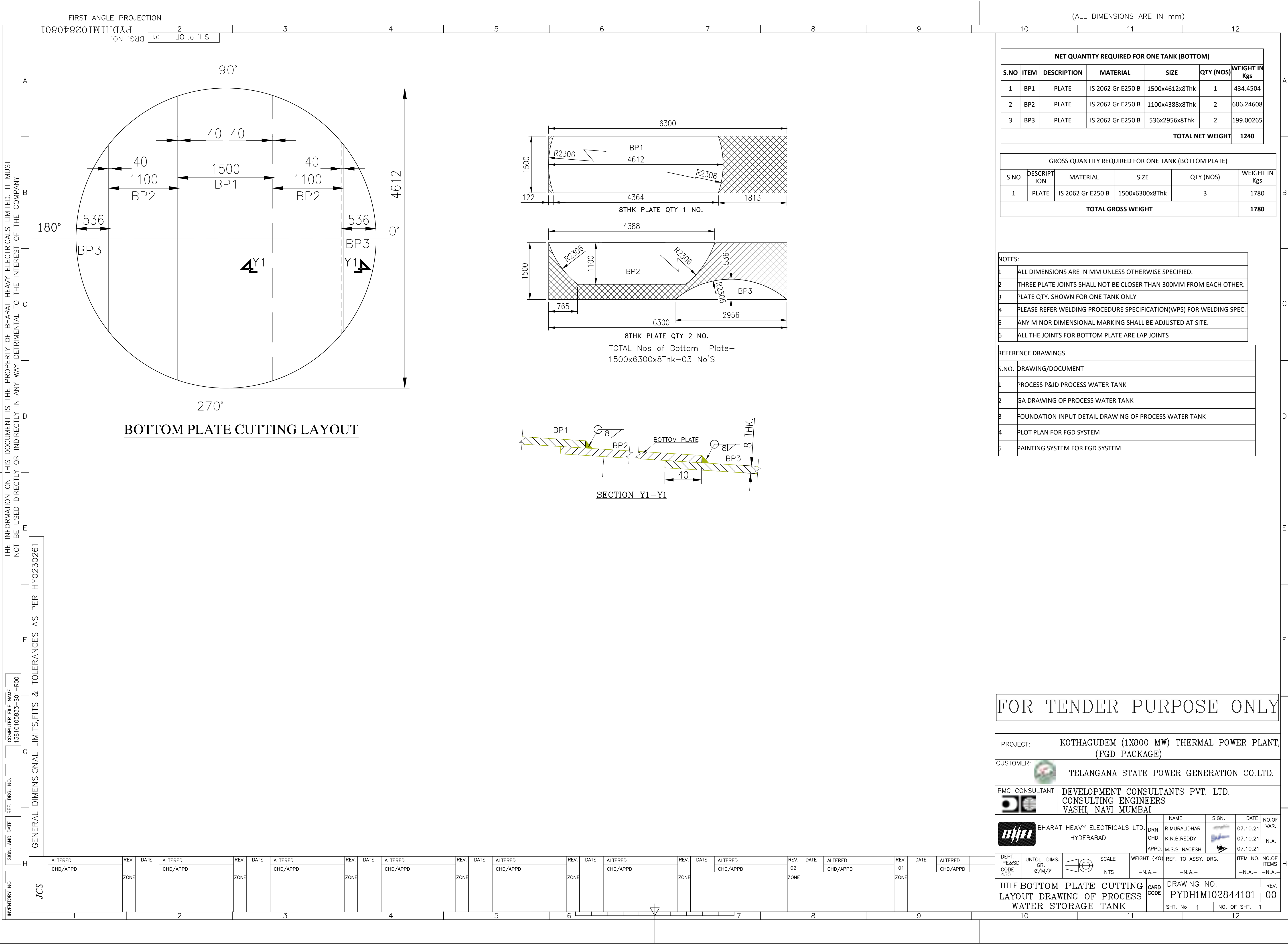
FABRICATION DRAWINGS FOR PROCESS WATER STORAGE TANK

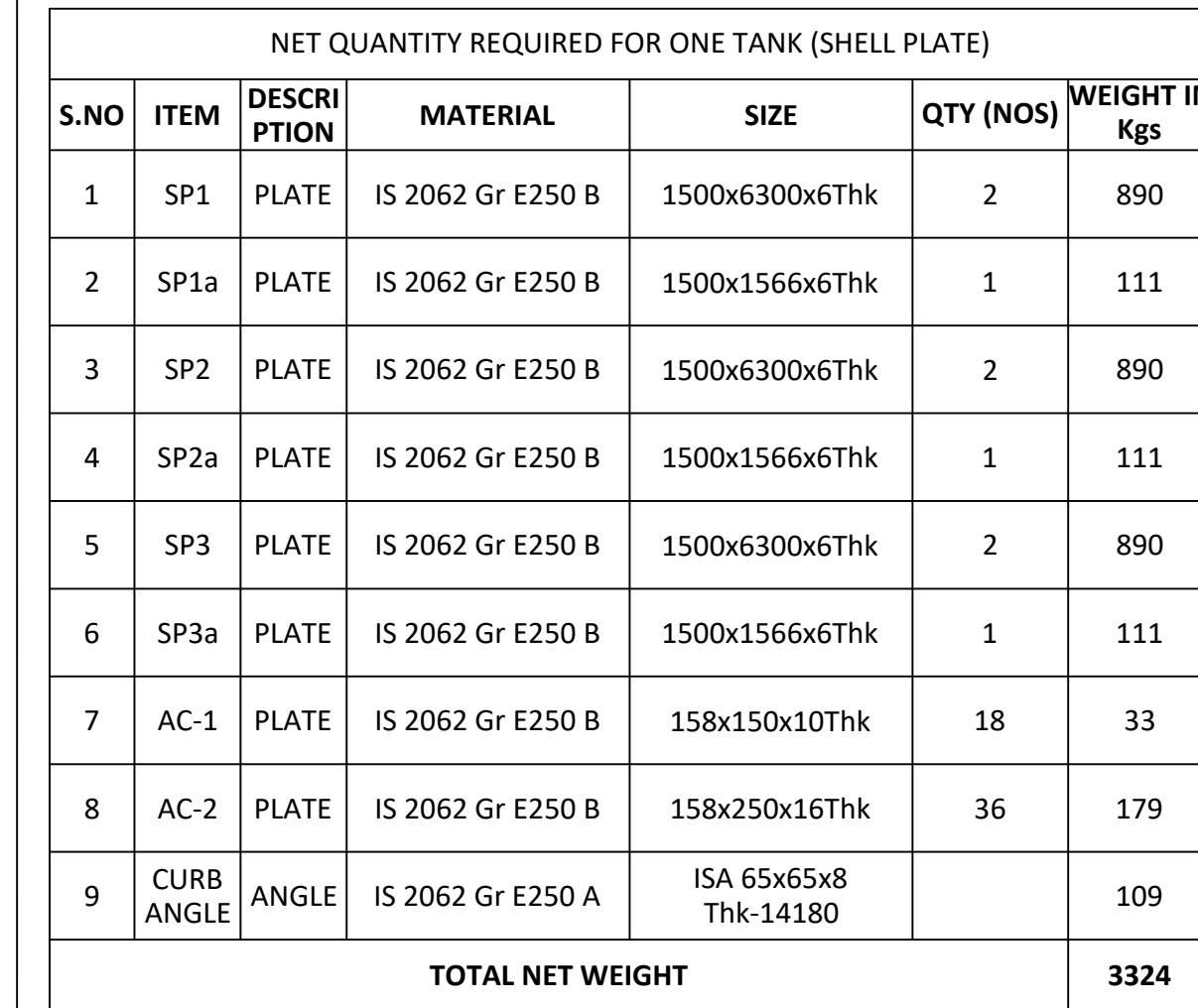
FOR TENDER PURPOSE ONLY

LIST OF DRAWINGS:

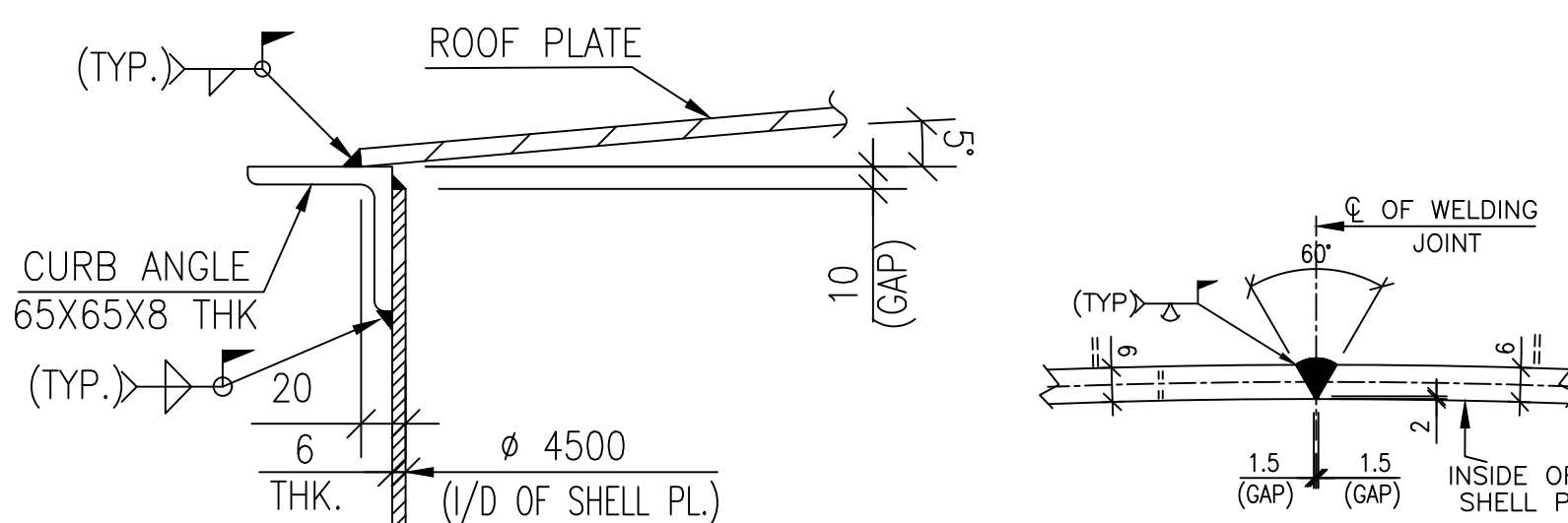
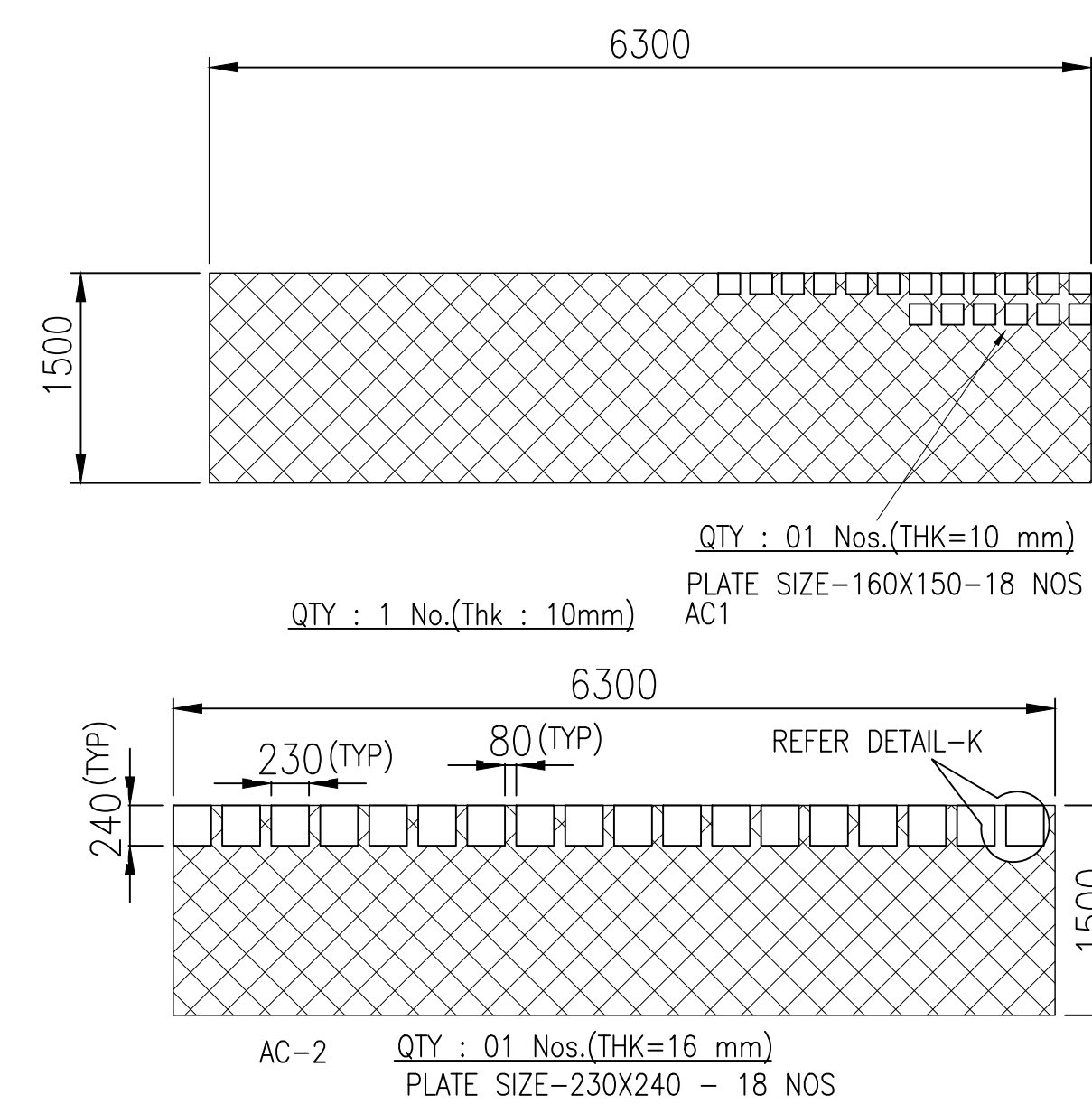
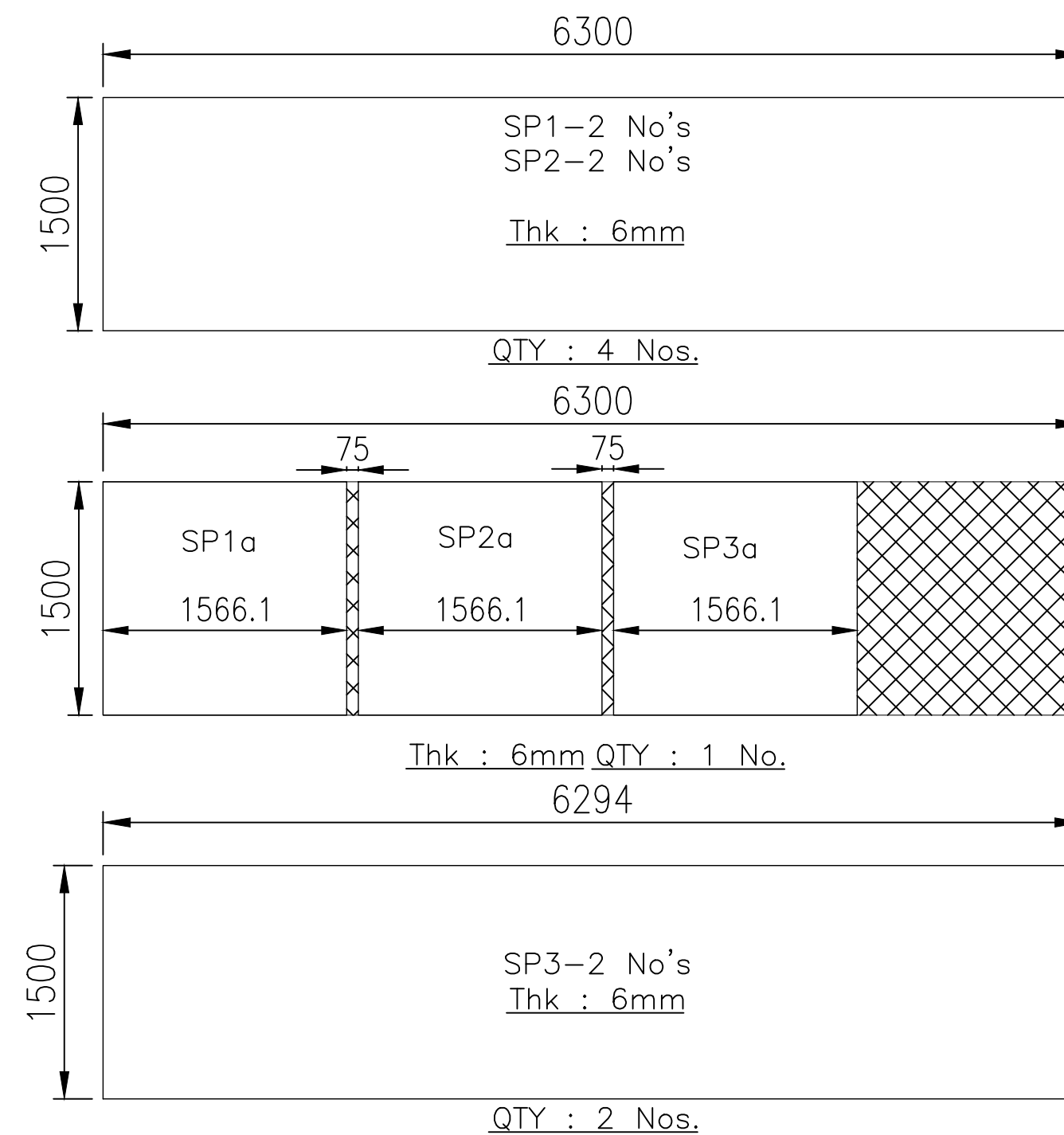
1. BOTTOM PLATE CUTTING LAYOUT
2. SHELL PLATE CUTTING LAYOUT
3. ROOF PLATE CUTTING LAYOUT
4. CORNER PLATE DETAIL DRAWING
5. STAIRCASE DETAIL DRAWING
6. NOZZLE DETAIL DRAWING
7. AGITATOR & ROOF STRUCTURE DETAIL DRAWING

00	17.05.23	INITIAL SUBMISSION																											
REV	DATE	DESCRIPTION																											
PROJECT		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)																											
CUSTOMER		 TELANGANA STATE POWER GENERATION CO.LTD.																											
CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA																											
ADDITIONAL INFORMATION		MANUFACTURER:  BHARAT HEAVY ELECTRICALS LTD. PE & SD HYDERABAD <table border="1"> <thead> <tr> <th></th> <th>NAME</th> <th>SIGN.</th> <th>DATE</th> <th>NO.OF VAR.</th> </tr> </thead> <tbody> <tr> <td>DRN.</td> <td></td> <td></td> <td></td> <td rowspan="3"></td> </tr> <tr> <td>CHD.</td> <td></td> <td></td> <td></td> </tr> <tr> <td>APPD.</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> DEPT. PESD CODE 450 UNTOL. DIM. GR. C/M/F  SCALE WEIGHT (KG) REF. TO ASSY DRG. ITEM NO. NO.OF ITEMS											NAME	SIGN.	DATE	NO.OF VAR.	DRN.					CHD.				APPD.			
	NAME											SIGN.	DATE	NO.OF VAR.															
DRN.																													
CHD.																													
APPD.																													
STATUS OF DRAWING																													
DISTRIBUTION OF PRINTS																													
TITLE: FABRICATION DRAWINGS FOR PROCESS WATER STORAGE TANK																													
CUSTOMER PACKAGE CODE		DOCUMENT NO PYDH1M162840801								REV. 00																			
DISCIPLINE		SHT No. 01								NO OF SHT. 01																			





GROSS QUANTITY REQUIRED FOR ONE TANK (SHELL PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	S 2062 Gr E250 B	1500x6300x6Thk	6	2671
2	PLATE	S 2062 Gr E250 B	1500x6300x6Thk	1	445
3	PLATE	S 2062 Gr E250 B	158x150x10Thk	1	111
4	PLATE	S 2062 Gr E250 B	158x250x16Thk	1	5
5	ANGLE	S 2062 Gr E250 A	SA 65x65x8Thk. - 14180 Lg.		109
TOTAL GROSS WEIGHT					3340



SECTION 1-

1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	ADJUSTMENT SHALL BE DONE ON THE LAST SPOOL PIECE, IF REQUIRED TO MAINTAIN TOTAL DESIRED LENGTH.
4	PLATE QTY. SHOWN FOR ONE TANK ONLY.
5	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING.
6	ALL SHELL PLATES, CURB ANGLE & REINFORCEMENT PLATES SHALL BE BENT TO TANK OUTER RADIUS.

S.NO.	DRAWING/DOCUMENT
1	PROCESS P&ID PROCESS WATER TANK
2	GA DRAWING OF PROCESS WATER TANK
3	FOUNDATION INPUT DETAIL DRAWING OF PROCESS WATER TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)
CUSTOMER:	 TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT:	 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD			NAME	SIGN.	DATE	NO. OF VAR.
					DRW.	R.MURALIDHAR	07.10.21	
					CHD.	K.N.B.REDDY	07.10.21	-N.A.-
					APPD.	M.S.S. NAGESH	07.10.21	
DEPT. PE&SD CODE 450	UNTOOL. DIMS. GR./M/F		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS	
	NTS		-N.A.-	-N.A.-	-N.A.-	-N.A.-		
TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF PROCESS WATER STORAGE TANK					CARO CODE	DRAWING NO.		REV. 00
						PYDHI1M102844101		
						SHT. No 1	NO. OF SHT. 1	

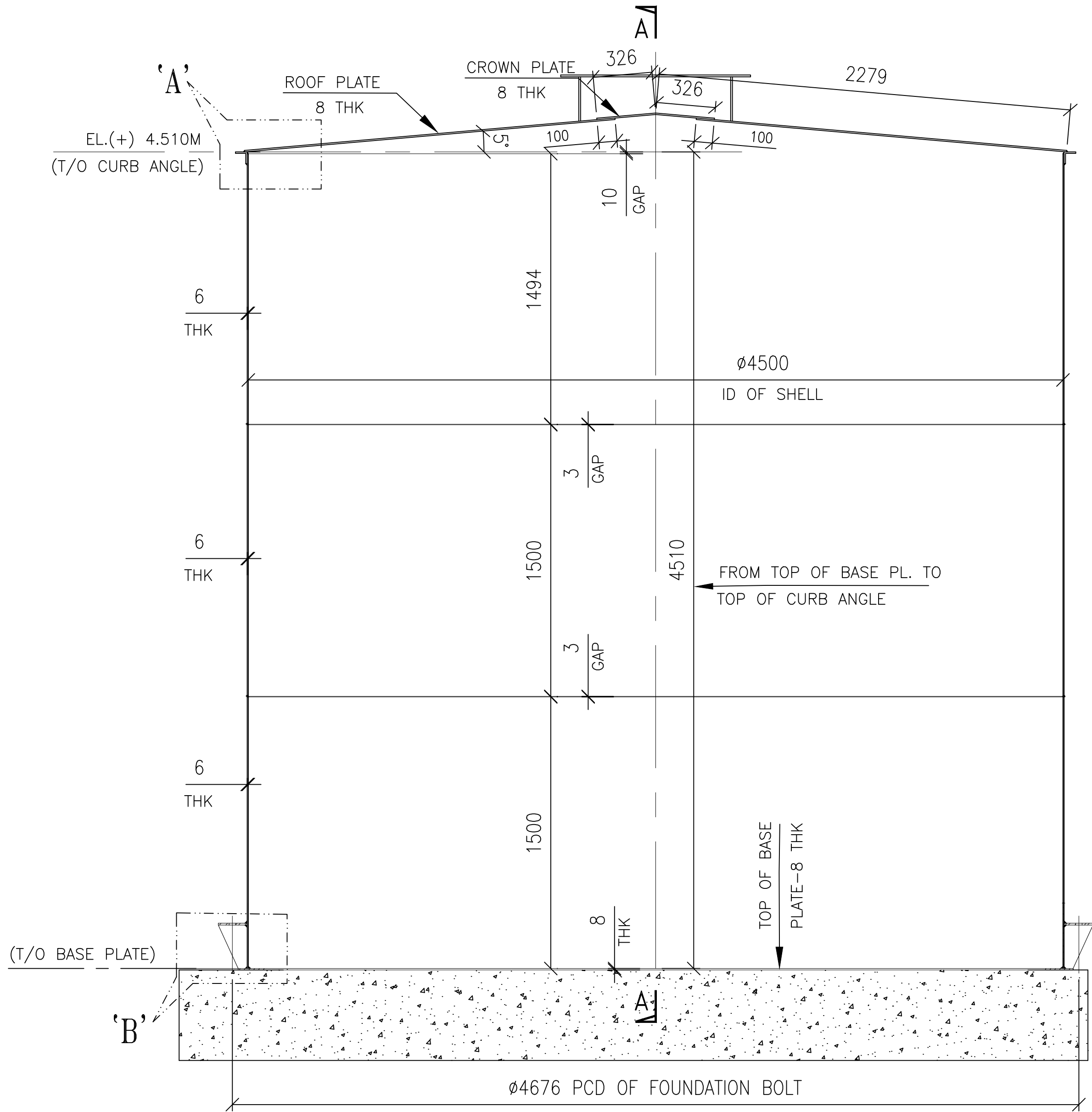
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ITEM	QTY	UNIT	DESCRIPTION
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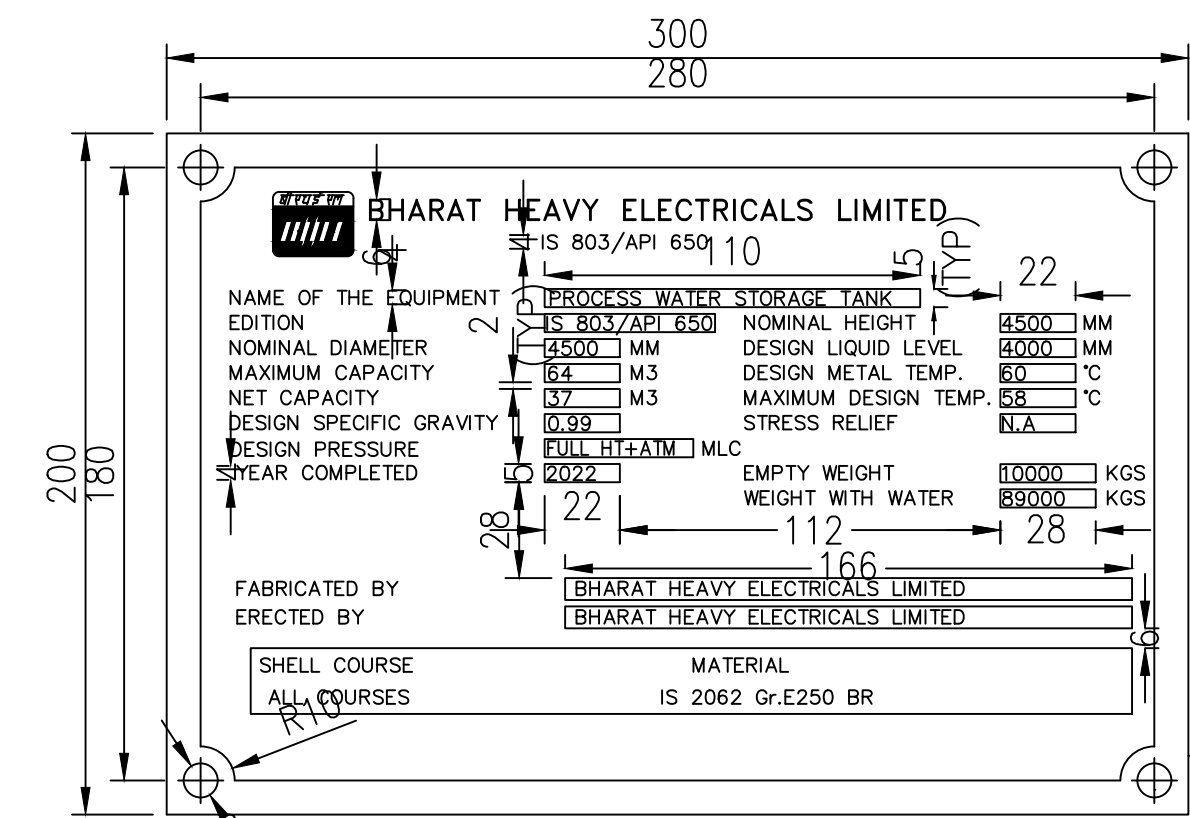
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

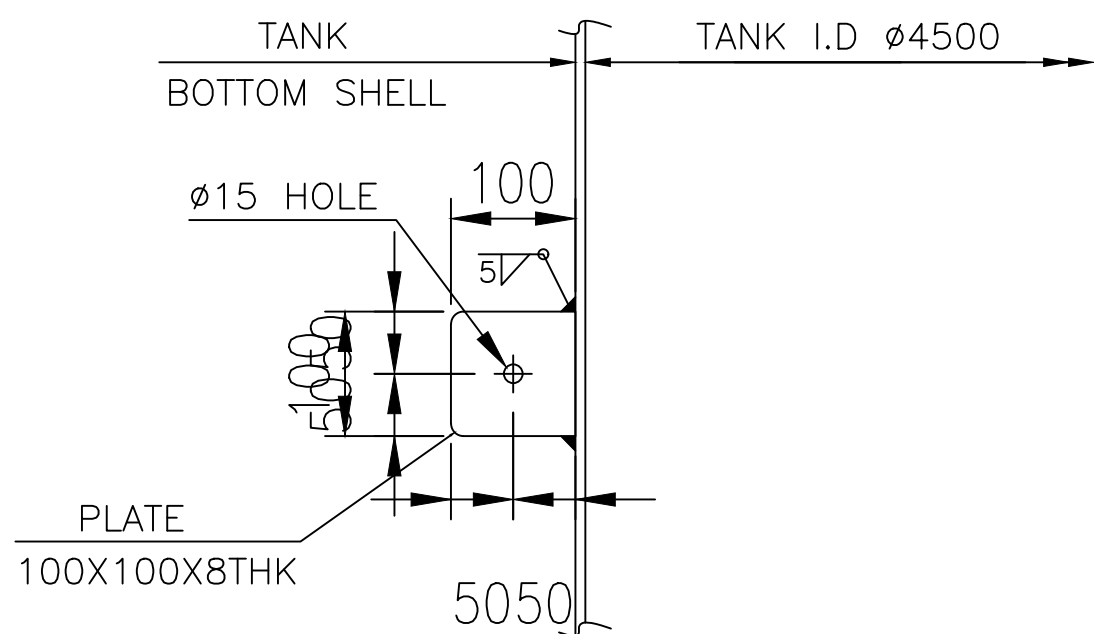
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SH. 02 OF 02



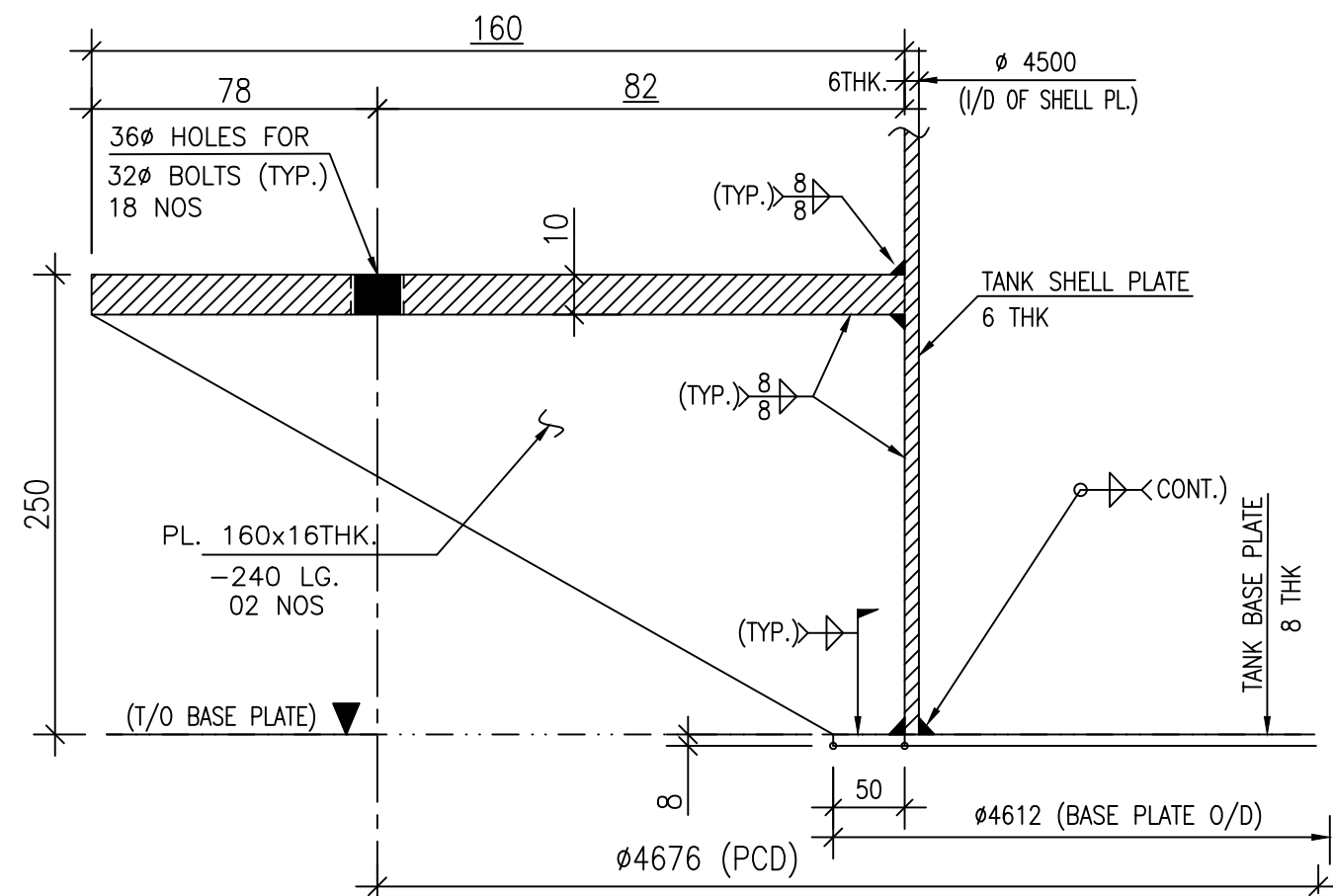
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Ø 4.5 Mx 4.5 M HEIGHT



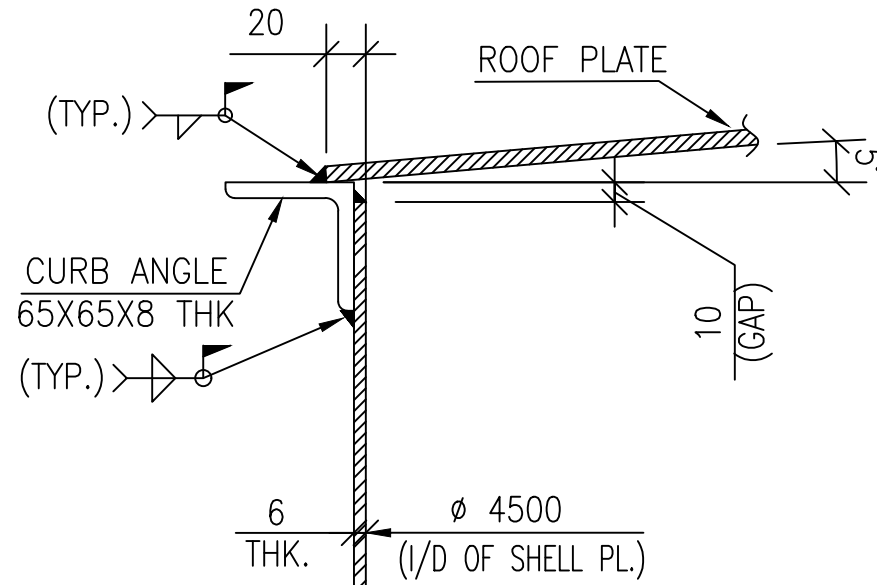
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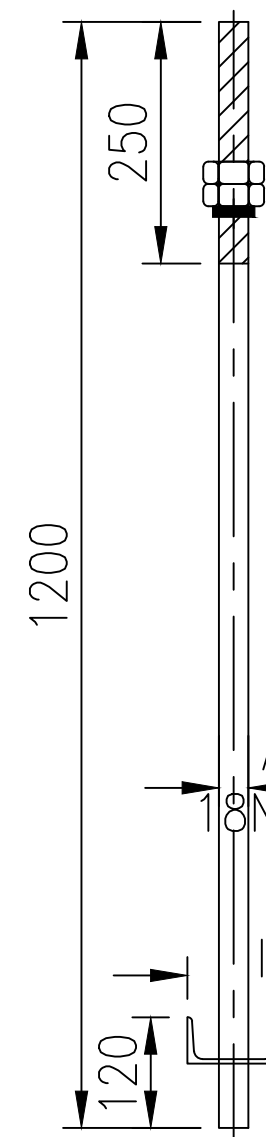
DETAIL OF EARTHING STRIP ②



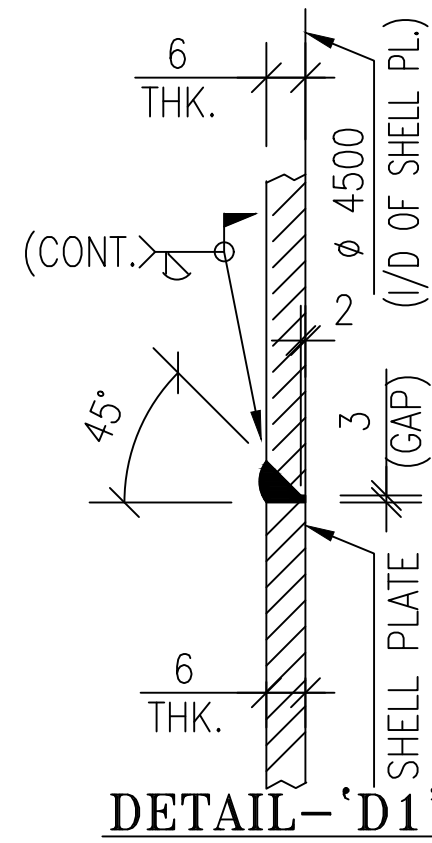
DETAIL-B



DETAIL-A



DETAIL OF ANCHOR BOLTS
QTY : 18NOs



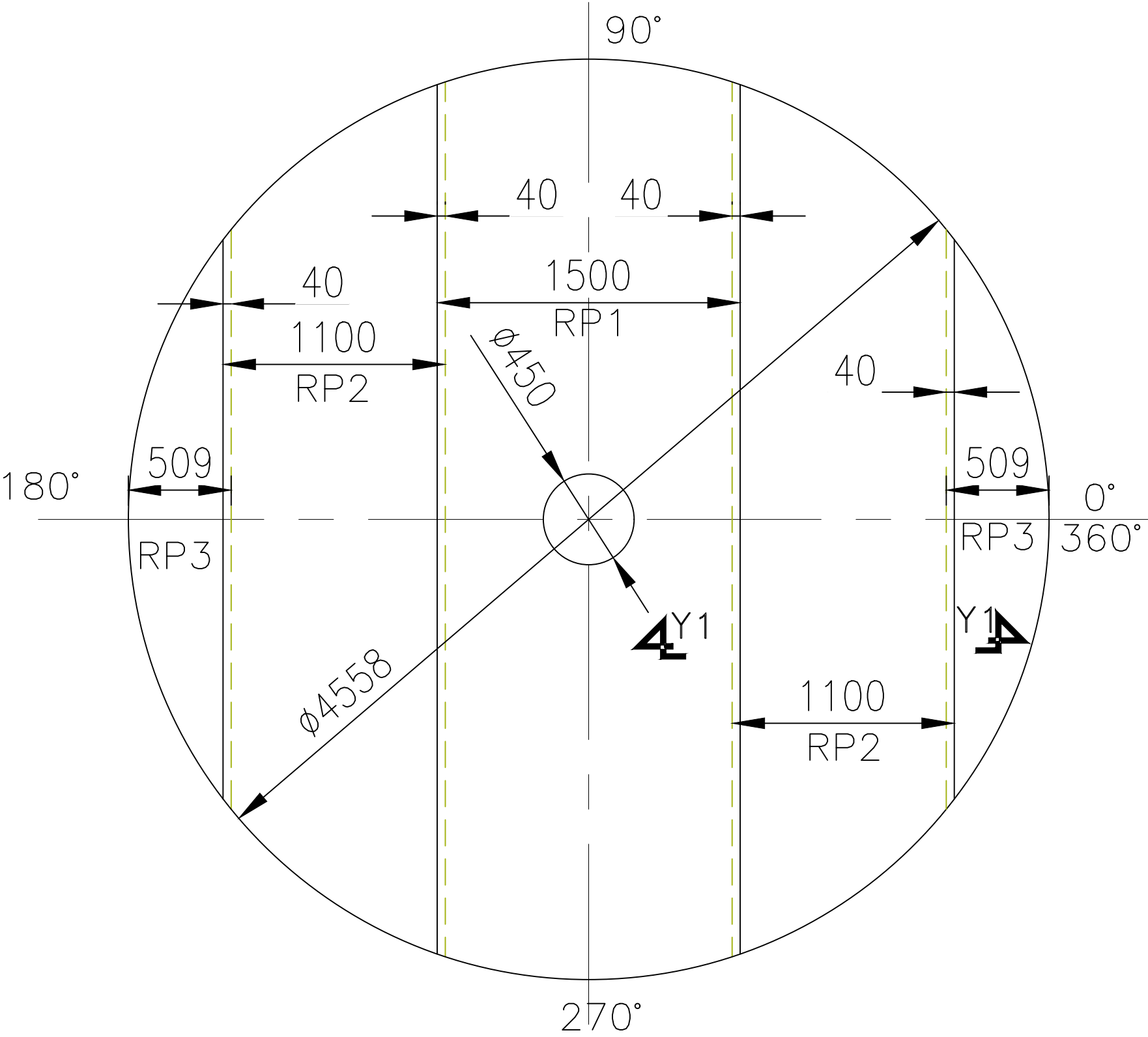
DETAIL-D1

S.No.	Description	Material	Size	Quantity	Unit Wt.(Kgs)	Total Wt. (Kgs)
1	NAME PLATE	SS 304	200x300x2 thk	1	--	--
2	EARTHING LUG	SS 304	100x100x8 thk	2	0.63	1.26
3	ANCHOR BOLTS & NUTS	IS 2062/ IS 1367	M32 X 1200LG	18	7.58	136.44
Total Net Weight						137.7

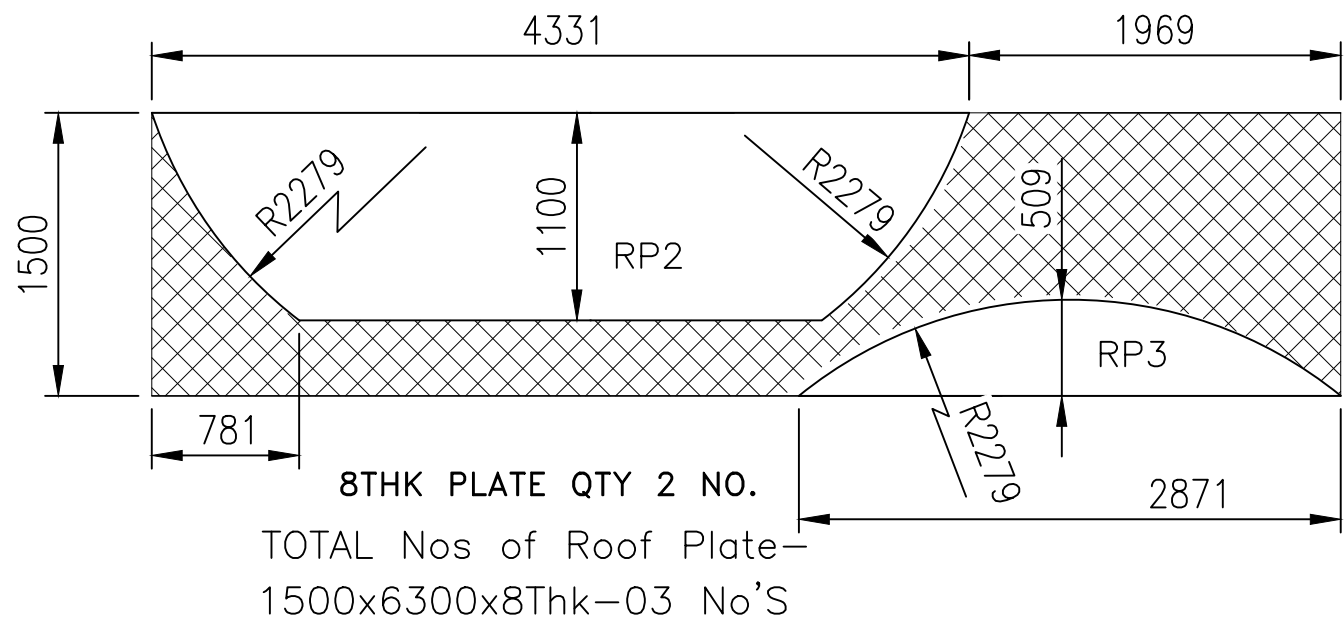
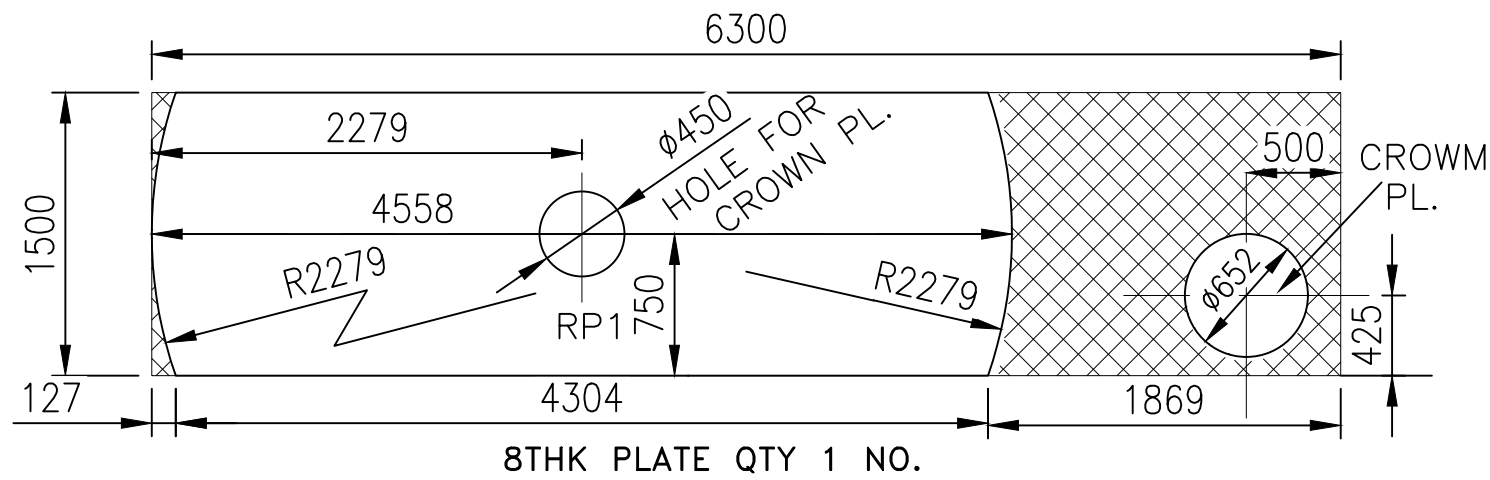
FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)
CUSTOMER:	TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT:	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

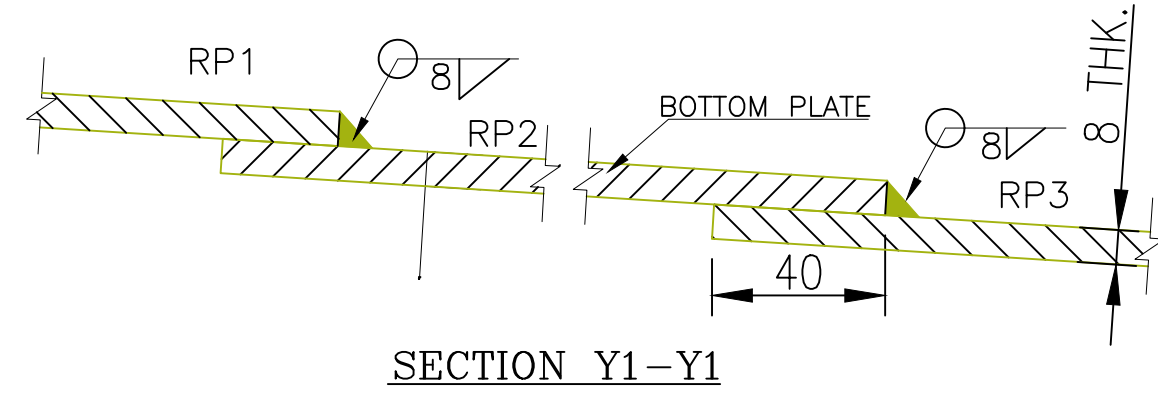
DEPT. PE&SD CODE 450	UNTO. DIMS. GR. 2/M/7	SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-	NO.OF ITEMS -N.A.-
TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF PROCESS WATER STORAGE TANK				DRAWING NO. PYDH1M102844101	REV. 00	NO. OF SHT. 1



ROOF PLATE CUTTING LAYOUT- 8mm THK



TOTAL Nos of Roof Plate-
1500x6300x8Thk-03 No's



(ALL DIMENSIONS ARE IN mm)

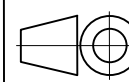
GROSS QUANTITY REQUIRED FOR ONE TANK (ROOF PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	IS 2062 Gr E250 B	1500x6300x8THK	1	593
2	RP2	IS 2062 Gr E250 B	1500x6300x8THK	1	593
3	CORNER PLATE	IS 2062 Gr E250 B	1500x6300x8THK	1	593
TOTAL GROSS WEIGHT					1780

GROSS QUANTITY REQUIRED FOR ONE TANK (ROOF PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	S 2062 Gr E250 B	1500x6300x8THK	3	1780
TOTAL GROSS WEIGHT					1780

NOTES:	
1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	ADJUSTMENT SHALL BE DONE ON THE LAST SPOOL PIECE, IF REQUIRED TO MAINTAIN TOTAL DESIRED LENGTH.
4	PLATE QTY. SHOWN FOR ONE TANK ONLY.
5	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING.

REFERENCE DRAWINGS	
S.NO.	DRAWING/DOCUMENT
1	PROCESS P&ID PROCESS WATER TANK
2	GA DRAWING OF PROCESS WATER TANK
3	FOUNDATION INPUT DETAIL DRAWING OF PROCESS WATER TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

FOR TENDER PURPOSE ONLY

PROJECT:		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT (FGD PACKAGE)						
CUSTOMER:		TELANGANA STATE POWER GENERATION CO.LTD.						
PMC CONSULTANT		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI						
		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME	SIGN.	DATE	NO.OF VAR.	
				DRN.	R.MURALIDHAR		07.10.21	
				CHD.	K.N.B.REDDY		07.10.21	N.A.-
				APPD.	M.S.S NAGESH		07.10.21	
DEPT. PE&SD CODE 450	UNTOL. DIMS. CR. 2/M/F		SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-	NO.OF ITEMS -N.A.-	
TITLE ROOF PLATE CUTTING LAYOUT DRAWING OF PROCESS WATER STORAGE TANK				CARD CODE	DRAWING NO. PYDH1M102844101		REV. 00	
				SHT. No 1		NO. OF SHT. 1		

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COMPUTER FILE NAME
13810105833-S01-ROO

REF. DRG. NO.

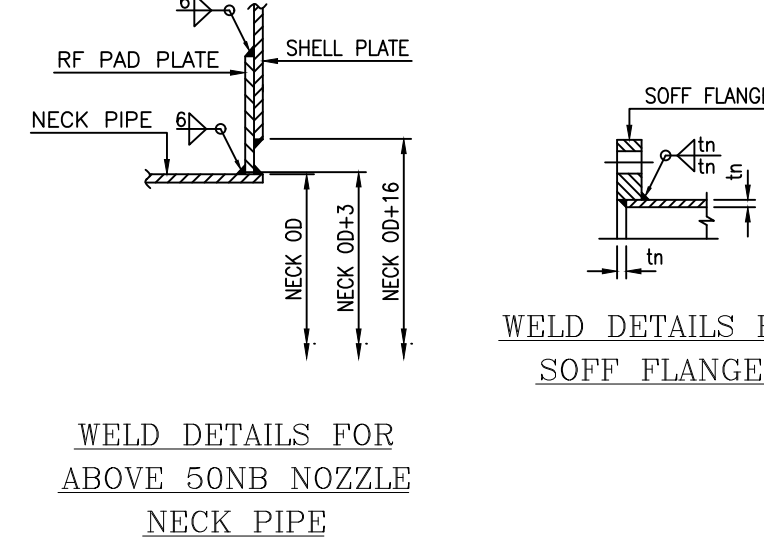
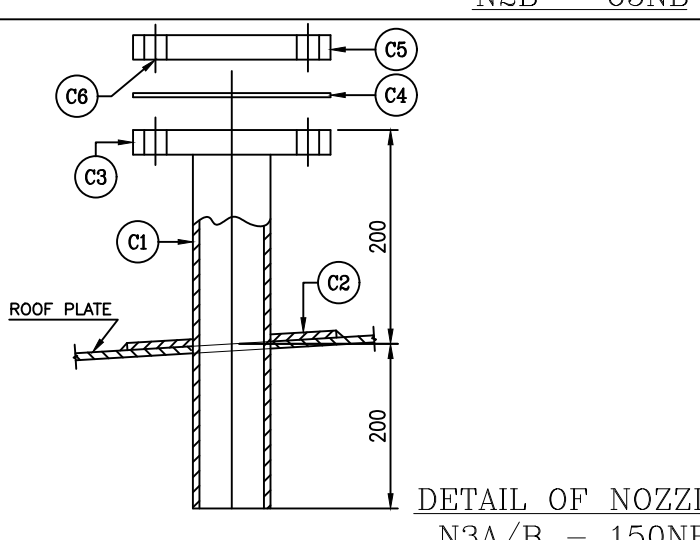
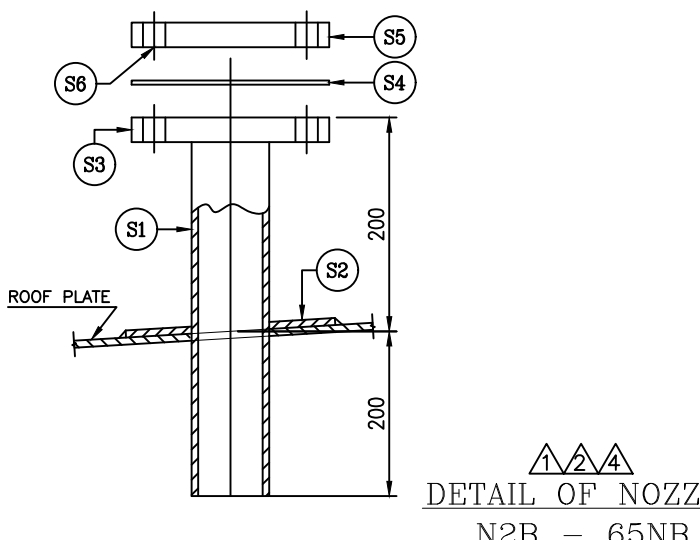
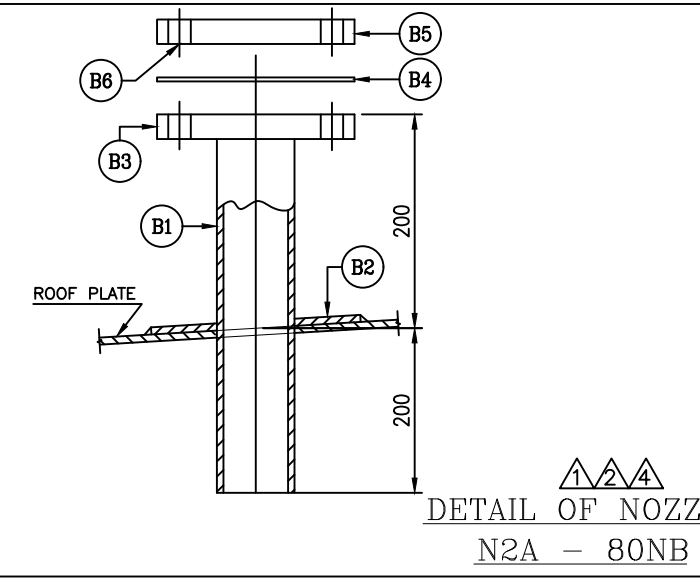
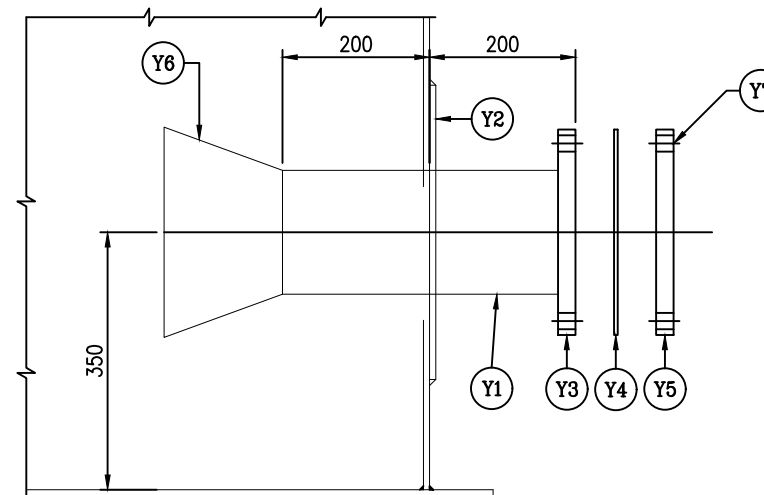
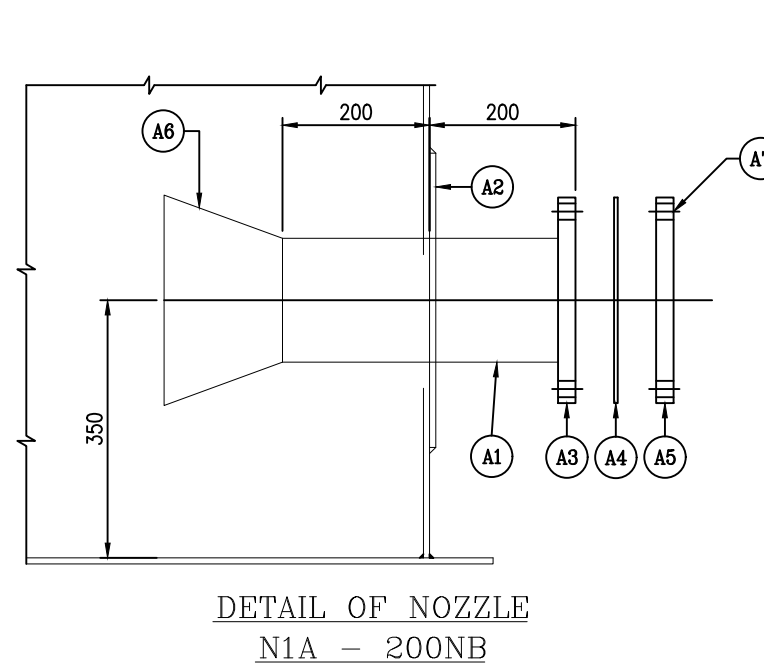
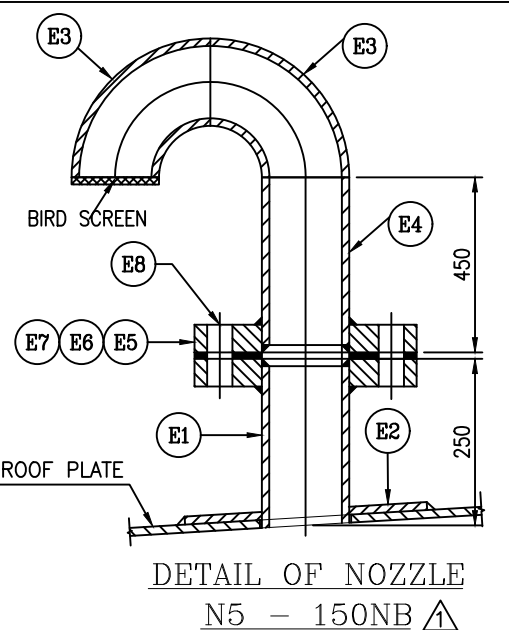
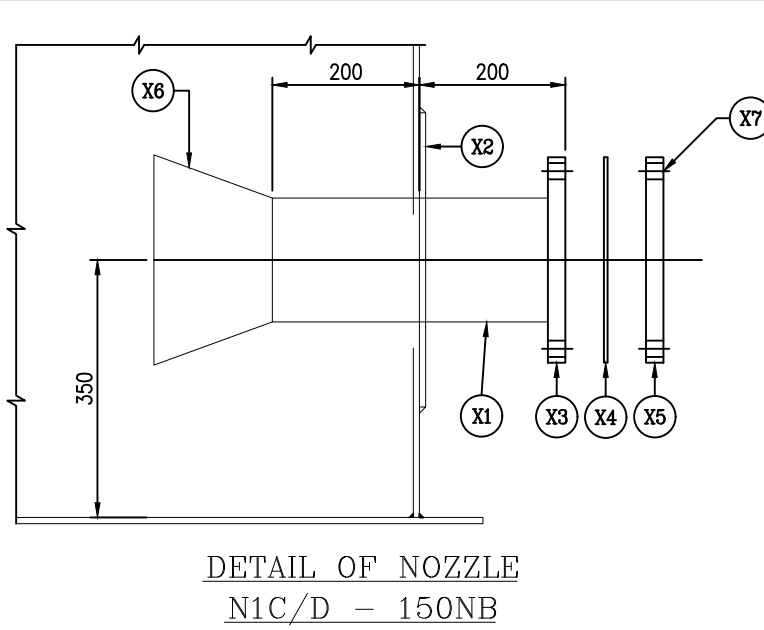
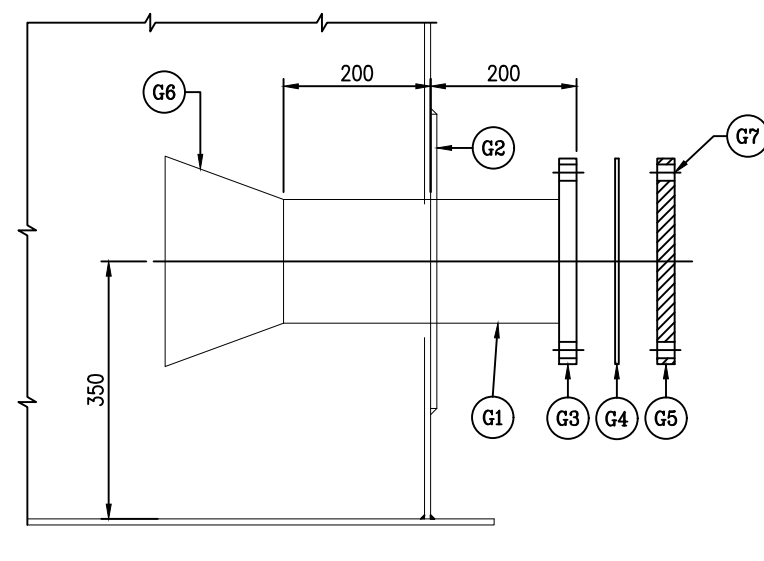
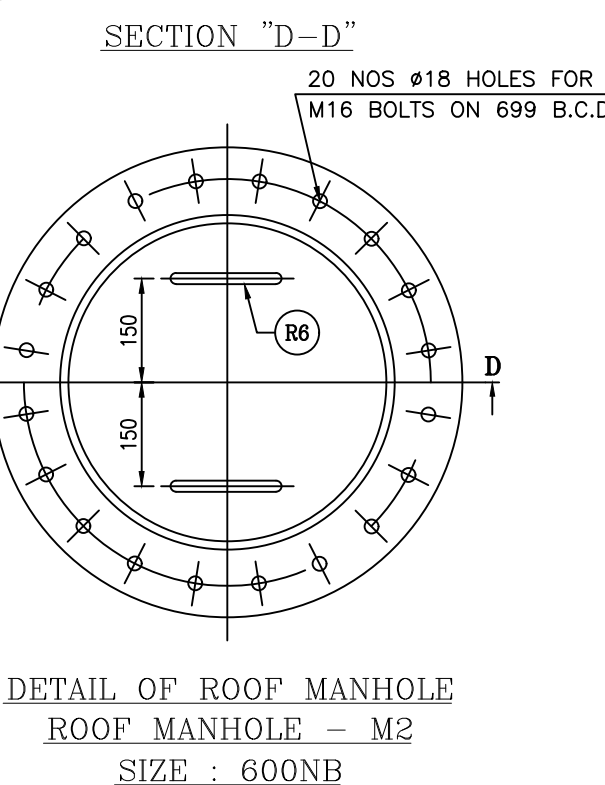
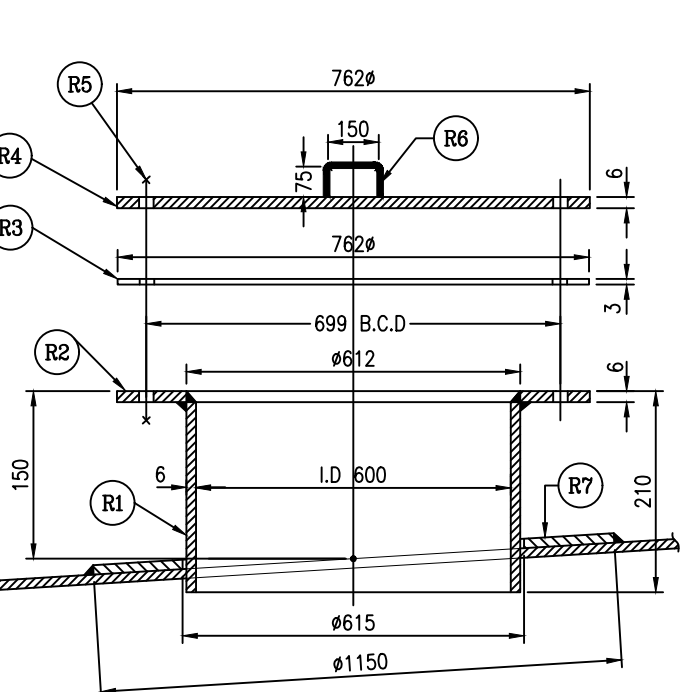
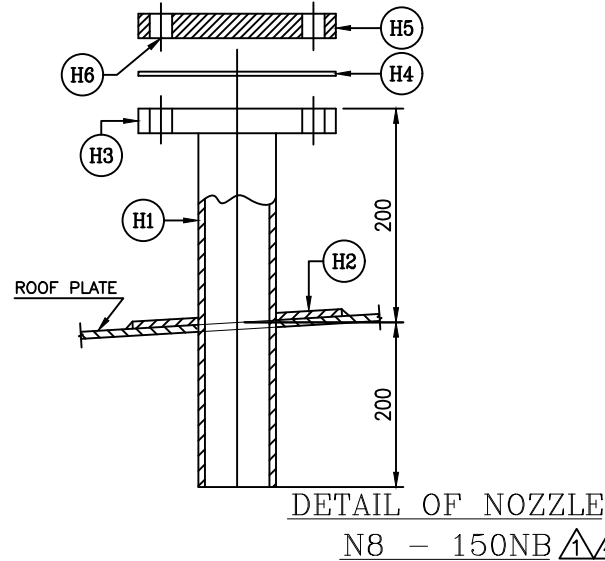
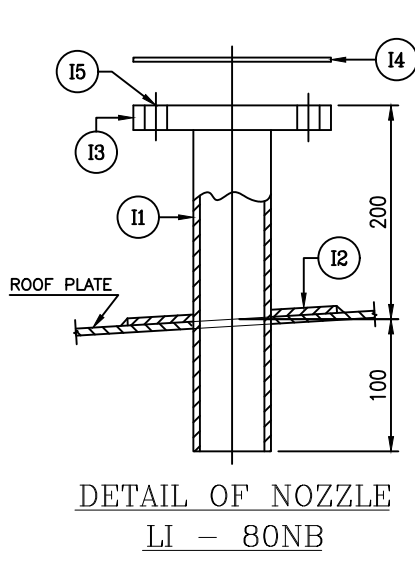
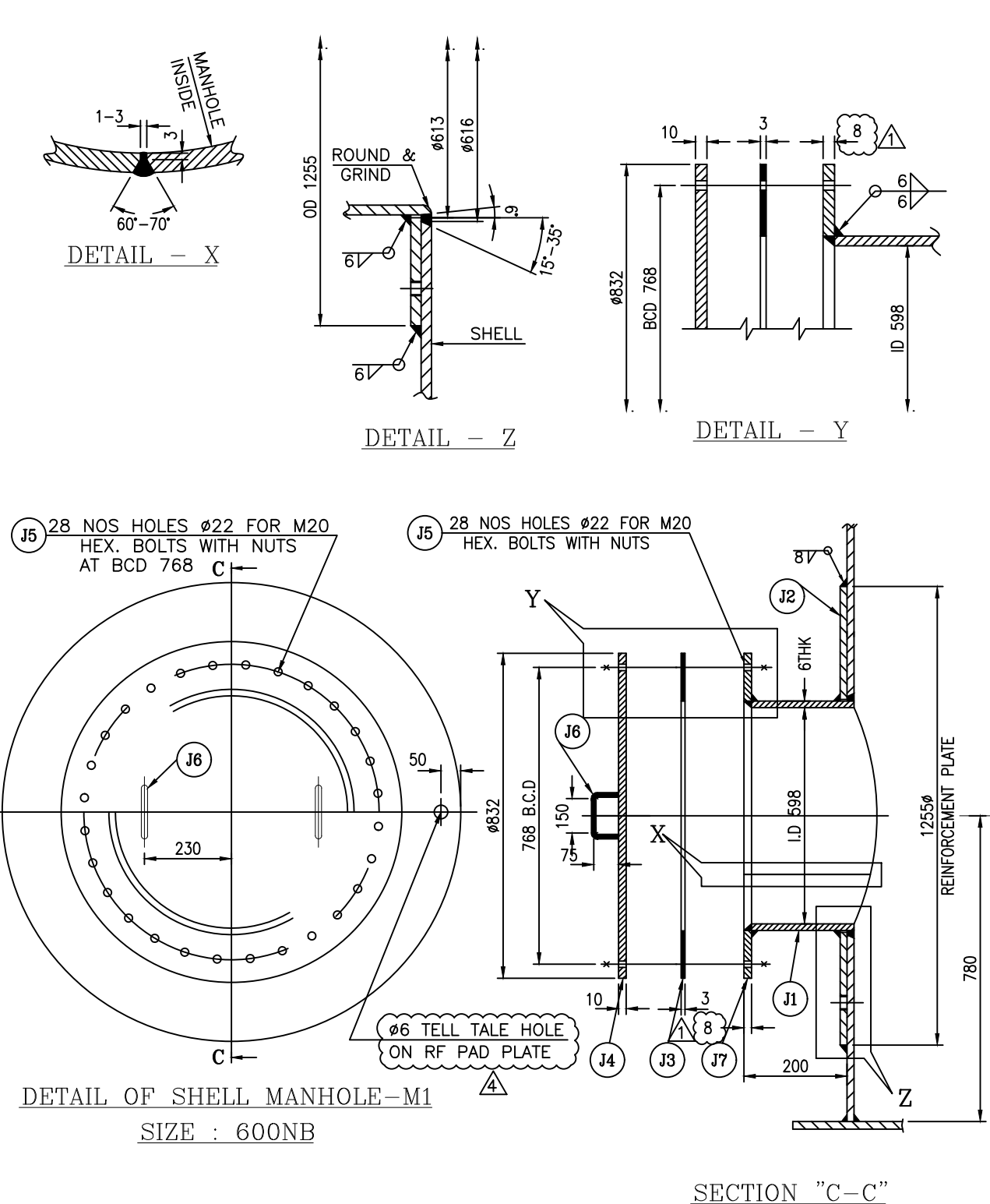
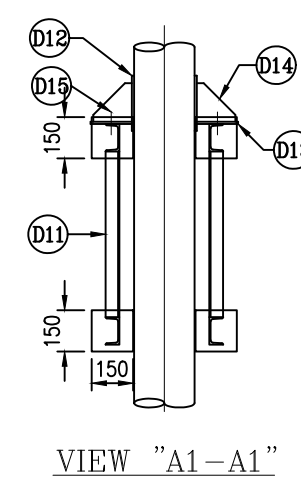
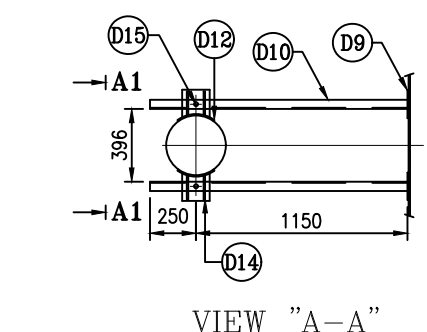
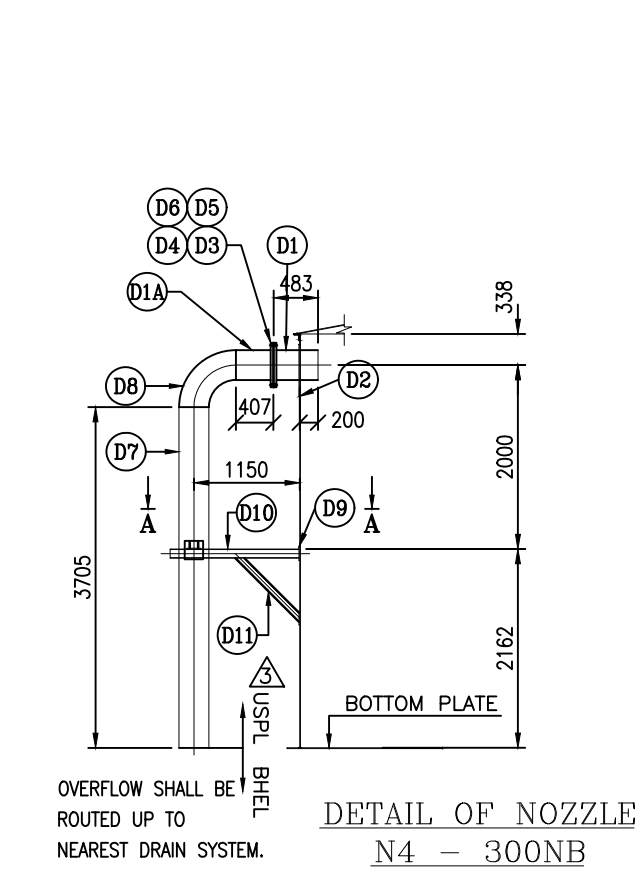
SIGN. AND DATE

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

FIRST ANGLE PROJECTION

90999900001M02G1P
DRG. NO. 10 OF 10 SH.

(ALL DIMENSIONS ARE IN mm)

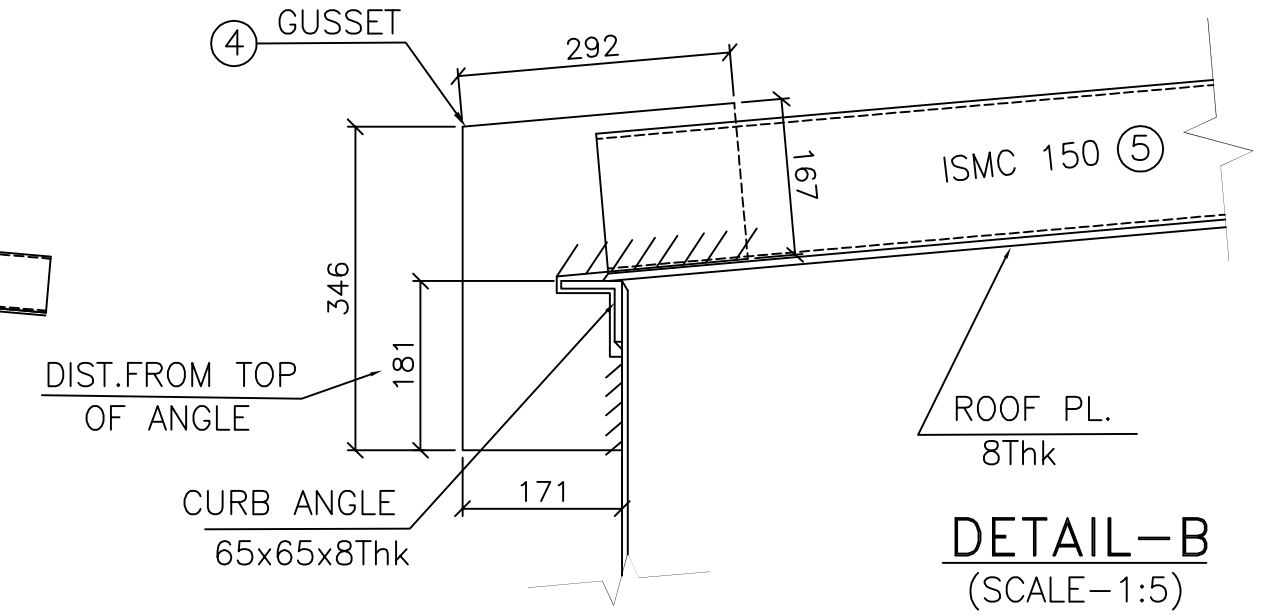


WELD DETAILS FOR
SOFF FLANGES

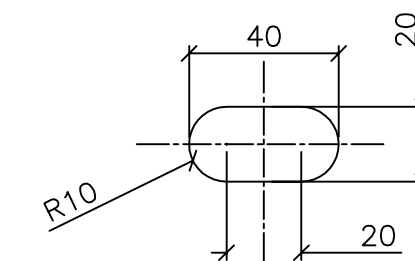
BILL OF MATERIAL FOR PROCESS WATER STORAGE TANK											
MARKED NO.	SL. NO.	DESCRIPTION	MATERIAL	SIZE	LENGTH (mm)	QTY	UNIT	WEIGHT (Kgs)	TOTAL WEIGHT (Kgs)		
N1 A - TANK PUMP SUCTION LINE - 200NB	A1	NECK PIPE	IS 3589, Gr Fe 410, ERW	200NB x 6.3thk	400	1	13.24	13.2			
	A2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 485 x ID 222 x 6THK.		1	6.9	6.9			
	A3	FLANGE	IS 2062, Gr E 250, BR	200NB #150 SOFF		1	13.7	13.7			
	A4	GASKET	NEOPRENE GASKET	OD 345 x ID 222 x 3THK.		1	-	-			
	A5	COUNTER FLANGE	IS 2062, Gr E 250, BR	200NB #150 SOFF		1	13.7	13.7			
N1 B - EMERGENCY QUENCH PUMP SUCTION LINE - 150NB	A6	DIFFUSER	ASTM A234 WPB	200NB x 250NB - Sch.40		1	10.7	10.7			
	A7	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 110Lg.		8	0.4	3.1			
	Y1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4thk	400	1	8.52	8.5			
	Y2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK.		1	4.8	4.8			
	Y3	FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF		1	8.6	8.6			
N1 C/D - TANK EMERGENCY QUENCH PUMP SUCTION LINE - 150NB	Y4	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK.		1	-	-			
	Y5	COUNTER FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF		1	8.6	8.6			
	Y6	DIFFUSER	ASTM A234 WPB	150NB x 200NB - Sch.40		1	6.5	6.5			
	Y7	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg.		8	0.4	2.9			
	X1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4thk	400	2	8.5	17.0			
N2A - MINIMUM FLOW LINE - 80NB	X2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK.		2	4.8	9.7			
	X3	FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF		2	8.6	17.2			
	X4	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK.		2	-	-			
	X5	COUNTER FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF		2	8.6	17.2			
	X6	DIFFUSER	ASTM A234 WPB	150NB x 200NB - Sch.40		1	6.5	6.5			
N2B - MINIMUM FLOW LINE - 65NB	X7	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg.		16	0.4	6.8			
	B1	NECK PIPE	IS 1239, PART-1 HEAVY	80NB x 4.8thk	400	1	4.0	4.0			
	B2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 265 x ID 92 x 6THK.		1	2.3	2.3			
	B3	FLANGE	IS 2062, Gr E 250, BR	80NB #150 SOFF		1	3.7	3.7			
	B4	GASKET	NEOPRENE GASKET	OD 190 x ID 92 x 3THK.		1	-	-			
N3 A/B - LIQUID INLET LINE - 150NB	B5	COUNTER FLANGE	IS 2062, Gr E 250, BR	80NB #150 SOFF		1	3.7	3.7			
	B6	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 90Lg.		4	0.2	0.8			
	S1	NECK PIPE	IS 1239, PART-1 HEAVY	65NB x 4.5thk	400	1	3.17	3.17			
	S2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 200 x ID 76 x 6THK.		1	1.3	1.3			
	S3	FLANGE	IS 2062, Gr E 250, BR	65NB #150 SOFF		1	3.2	3.2			
N4 - OVERFLOW LINE - 300NB	S4	GASKET	NEOPRENE GASKET	OD 180 x ID 76 x 3THK.		1	-	-			
	S5	COUNTER FLANGE	IS 2062, Gr E 250, BR	300NB #150 SOFF		1	3.2	3.2			
	S6	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 90Lg.		4	0.2	0.8			
	C1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4thk	400	2	8.92	17.8			
	C2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK.		2	4.8	9.7			
N5 - VENT WITH GOOSE NECK - 150NB	C3	FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF		2	8.6	17.2			
	C4	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK.		2	-	-			
	C5	COUNTER FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF		2	8.6	17.2			
	D1	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg.		16	0.4	6.8			
	D1A	NECK PIPE	IS 3589, Gr Fe 410, ERW	300NB x 7.1thk	483	1	26.8	26.8			
N6 - DRAIN LINE - 100NB	D1A	PIPE AFTER FLANGE	IS 3589, Gr Fe 410, ERW	300NB x 7.1thk	407	1	22.6	22.6			
	D2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 685 x ID 327 x 6THK.		1	13.4	13.4			
	D3	COUNTER FLANGE	IS 2062, Gr E 250, BR	300NB #150 SOFF		1	29.0	29.0			
	D4	GASKET	NEOPRENE GASKET	OD 485 x ID 327 x 3THK.		1	-	-			
	D5	COUNTER FLANGE	IS 2062, Gr E 250, BR	300NB #150 SOFF		1	29.0	29.0			
N7 - SPARE OUTLET - 200NB	D6	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M24 x 120Lg.		12	0.6	7.6			
	D7	PIPE	IS 3589, Gr Fe 410, ERW	300NB x 7.1thk	3705	1	205.4	205.4			
	D8	ELBOW	ASTM A234 WPB	300NB, 90DEG L.R. B.W.		1	58.2	58.2			
	D9	PAD PLATE	IS 2062, Gr E 250, BR	150 x 150 x 6THK.		4	1.05975	4.2			
	D10	ISMC 100	IS 2062, Gr E 250, A	1400 Lg.		2	9.2	18.4			
N8 - SPARE INLET - 150NB	D11	ISMC 75	IS 2062, Gr E 250, A	1000 Lg.		2	6.8	13.6			
	D12	PAD PLATE FOR PIPE	IS 2062, Gr E 250, BR	200 x 200 x 8THK.		2	2.512	5.0			
	D13	BASE PLATE ON PIPE	IS 2062, Gr E 250, BR	150 x 150 x 8THK.		2	1.413	2.8			
	D14	STIFFENERS	IS 2062, Gr E 250, BR	140 x 140 x 8T		4	1.23088	4.9			
	D15	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 90Lg.		2	0.5	1.0			
N9 - LEVEL INSTRUMENT - 80NB	E1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4thk	250	1	4.24	4.2			
	E2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK.		1	4.8	4.8			
	E3	ELBOW	ASTM A234 WPB	150NB, 90DEG L.R. B.W.		2	10.2	20.4			
	E4	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4thk	450	1	9.54	9.5			
	E5	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg.		8	0.4	3.1			
M1 - SHELL MANHOLE - 600NB	E6	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK.		1	-	-			
	E7	COUNTER FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF		1	8.6	8.6			
	F1	TOP PLATE	IS 2062, Gr E 250, BR	540 x 920 x 8THK.		1	31.2	31.2			
	F2	BOTTOM PLATE	IS 2062, Gr E 250, BR	540 x 864 x 8THK.		1	29.30	29.3			
	F3	SIDE PLATE	IS 2062, Gr E 250, BR	500 x 920 x 8THK.		2	28.9	57.8			
M2 - ROOF MANHOLE - 600NB	F4	FLANGE PLATE-1	IS 2062, Gr E 250, BR	650 x 67 x 8THK.		2	2.7	5.5			
	F5	FLANGE PLATE-2	IS 2062, Gr E 250, BR	516 x 67 x 8THK.		2	2.2	4.3			
	F6	COVER PLATE	IS 2062, Gr E 250, BR	650 x 650 x 8THK.		1	26.5	26.5			
	F7	GASKET	NEOPRENE GASKET	OD 650 x ID 516 x 3THK.		1	0	0			
	F8	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 60Lg.		24	0.2	4.8			
TOTAL WEIGHT IN KGS										1328.0	

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)			
CUSTOMER:	TELANGANA STATE POWER GENERATION CO.LTD.			
PMC CONSULTANT:	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI			
DEPT. PE&SD CODE 450	UNTOOL. DIMS. GR. 8/M/9	SCALE NTS	WEIGHT (KG) REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-
TITLINOZZLE DETAIL DRAWING PROCESS WATER STORAGE TANK		DRAWING NO. PYDH1M102844101		REV. 00
SHT. No 1		NO. OF SHT. 1		

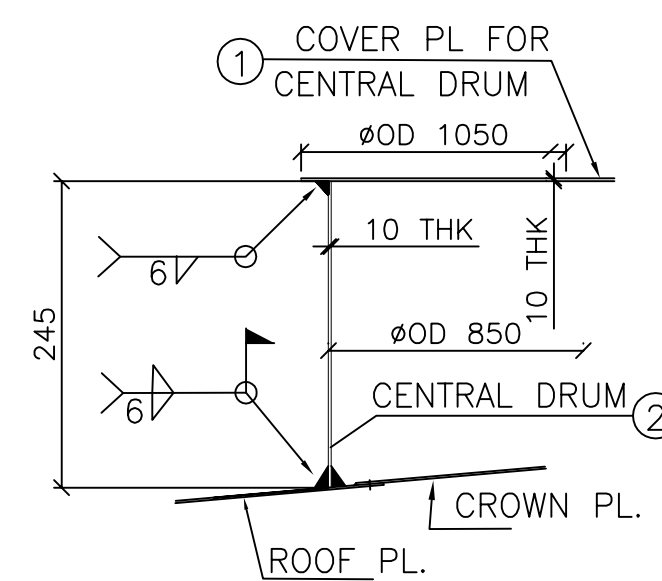


DETAIL-B
(SCALE-1:5)

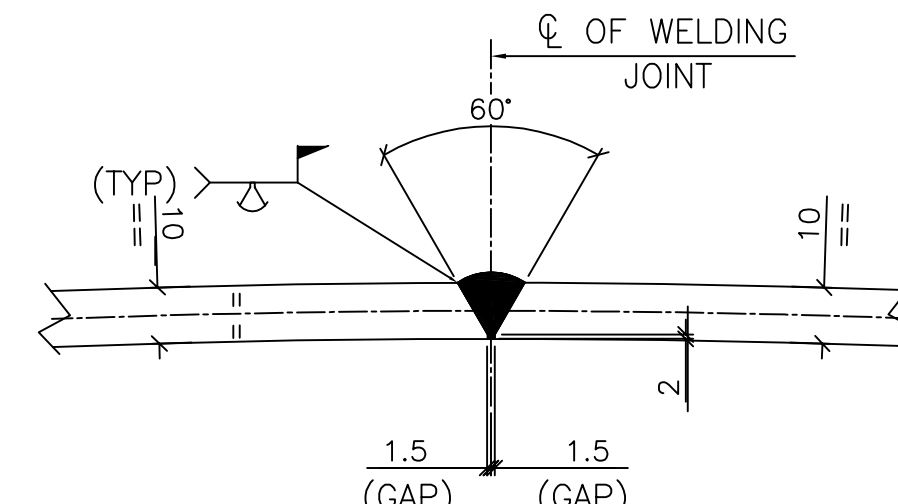


GUSSET PL.-3
10 THK
(SCALE-1:8)

- 1.ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE NOTED.
- 2.ALL FILLET WELD TO BE 6MM UNLESS OTHERWISE SPECIFIED .
- 3.GAP BETWEEN RAFTER AND ROOF PL. TO BE FILLED WITH 6MM ALL AROUND FILLET WELD AT SITE.



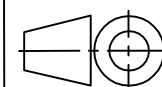
WELD DETAILS OF CENTRAL DRUM

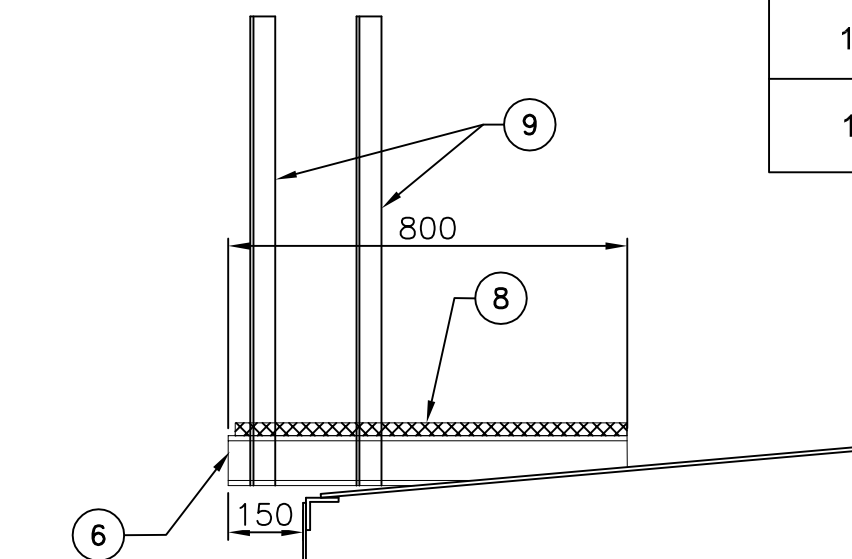


LONGITUDINAL WELD
DETAILS OF CENTRAL DRUM
(SCALE- N T S)

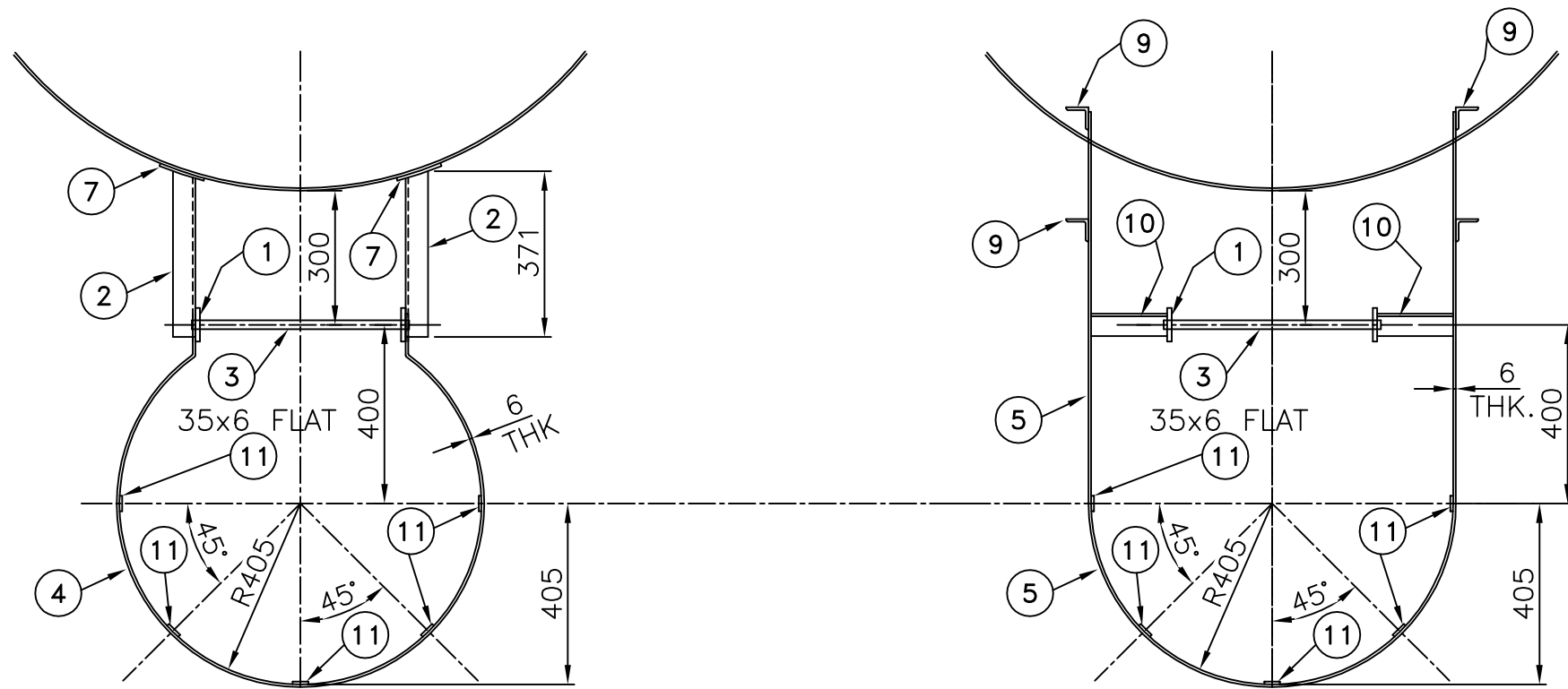
LOCATIONS	FILLETS	GROOVE	
		SQUARE	BEVEL
ARROW SIDE			
OTHER SIDE			
BOTH SIDE			

SR NO	DESCRIPTION	SIZE	QTY	MATERIAL	WEIGHT PER UNIT (KG)	TOTAL WEIGHT (KG)
1	CENTRAL DRUM	245X2670X10THK	1	IS 2062, Gr E250, B	51.35	51.35
2	COVER PL FOR CENTRAL DRUM	DIA 1050X10THK	1	IS 2062, Gr E250, B	67.97	67.97
3	GUSSET PL.	227X170X10THK	8	IS 2062, Gr E250, B	3.03	24.24
4	GUSSET PL.	292X346X10THK	8	IS 2062, Gr E250, B	7.93	63.44
5	ISMC 150	1820 LG	8	IS 2062, Gr E250, A	29.848	238.784
6	HEX BOLT	M16X70LG	32	ASTM A193 Gr B7	0.1	3.2
7	NUT	M16	32	ASTM A194 Gr 2H	0.03	0.96
8	2 WASHER	M16	64	STAINLESS STEEL	0.01	0.64
					TOTAL WT.	450.584

PROJECT:		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)						
CUSTOMER:		 TELANGANA STATE POWER GENERATION CO.LTD.						
PMC CONSULTANT		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI						
		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD			NAME	SIGN.	DATE	NO.OF VAR.
				DRN.	R.MURALIDHAR		07.10.21	
				CHD.	K.N.B.REDDY		07.10.21	-N.A.-
				APPD.	M.S.S. NAGESH		07.10.21	
DEPT. PE&SD CODE 450	UNTOL. DIMS. GR. ø/M/F		SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-	NO.OF ITEMS -N.A.-	
TITLE RAFTER SUPPORT DETAIL DRAWING FOR PROCESS WATER STORAGE TANK					CARD CODE	DRAWING NO. PYDH1M102844101 00		REV. 00
					SHT. No	1	NO. OF SHT.	1

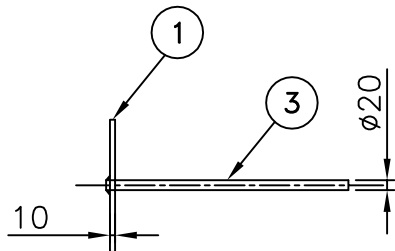


DETAILS OF LANDING PLATFORM



VIEW-A-A

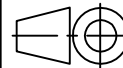
VIEW-B-B



ATTACHMENT OF LADDER RUNG TO LADDER POST

BILL OF MATERIAL					
SR NO	DESCRIPTION	MATERAIL	SIZE	LENGTH (mm)	QTY
1	Ladder Post Flat	IS 2062, Gr E250, A	IS FLAT-75X10THK	~5400	2
2	Support for Ladder Post	IS 2062, Gr E250, A	ISA 50X50X6	~345	6
3	Rungs	IS 1239, PART 1 MEDIUM	PIPE ø20	486	15
4	Ladder Cage	IS 2062, Gr E250, A	IS FLAT-50X6THK	~2800	04
5	Cage Hoop	IS 2062, Gr E250, A	IS FLAT-50X6THK	~4500	01
6	ISMC	IS 2062, Gr E250, A	ISMC 100	~850	2
7	PAD PLATE	IS 2062, Gr E250, B	150X150X6 THK	NA	6
8	GRATING		850X850		01
9	ENTRANCE HANDRAIL ANGLE	IS 2062, Gr E250, A	ISA 50X50X6	~1100	4
10	CAGE HOOP SUPP.ANGLE	IS 2062, Gr E250, A	ISA 50X50X6	~180	2
11	LADDER FLAT	IS 2062, Gr E250, A	IS FLAT-35X6THK	~3100	5

JCS	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE						
	CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD								
	ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE								
	1			2			3			4			5			6			7			8			9		

FOR TENDER PURPOSE ONLY									
PROJECT:		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)							
CUSTOMER:		TELANGANA STATE POWER GENERATION CO.LTD.							
PMC CONSULTANT		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI							
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN.	NAME	SIGN.	DATE	NO.OF VAR.			
		CHD.	R.MURALIDHAR		07.10.21				
		APPD.	K.N.B.REDDY		07.10.21	-N.A.-			
			M.S.S NAGESH		07.10.21				
DEPT. PE&SD CODE 450	UNTOL. DIMS. GR. C/M/F		SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-	NO.OF ITEMS -N.A.-		
TITLE DETAILS OF CAGED LADDER FOR PWT TANKS				CARD CODE	DRAWING NO. PYDH1M02844101			REV. 00	
				SHT. No 1	NO. OF SHT. 1				

FABRICATION DRAWINGS FOR SECONDARY HYDROCYCLONE FEED STORAGE TANK

FOR TENDER PURPOSE ONLY

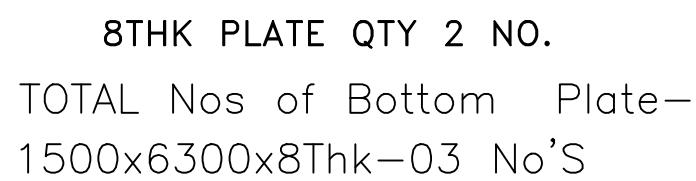
LIST OF DRAWINGS:

1. BOTTOM PLATE CUTTING LAYOUT
2. SHELL PLATE CUTTING LAYOUT
3. ROOF PLATE CUTTING LAYOUT
4. CORNER PLATE DETAIL DRAWING
5. STAIRCASE DETAIL DRAWING
6. NOZZLE DETAIL DRAWING
7. AGITATOR & ROOF STRUCTURE DETAIL DRAWING

00	17.05.23	INITIAL SUBMISSION																											
REV	DATE	DESCRIPTION																											
PROJECT		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)																											
CUSTOMER		 TELANGANA STATE POWER GENERATION CO.LTD.																											
CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS, VASHI, NAVI MUMBAI.																											
ADDITIONAL INFORMATION		 BHARAT HEAVY ELECTRICALS LTD. PE & SD HYDERABAD <table border="1"> <thead> <tr> <th></th> <th>NAME</th> <th>SIGN.</th> <th>DATE</th> <th>NO.OF VAR.</th> </tr> </thead> <tbody> <tr> <td>DRN.</td> <td>RATISH KUMAR</td> <td></td> <td>26.11.22</td> <td rowspan="3"></td> </tr> <tr> <td>CHD.</td> <td>R.MURALIDHAR</td> <td></td> <td>26.11.22</td> </tr> <tr> <td>APPD.</td> <td>M.S.S.NAGESH</td> <td></td> <td>26.11.22</td> </tr> </tbody> </table>											NAME	SIGN.	DATE	NO.OF VAR.	DRN.	RATISH KUMAR		26.11.22		CHD.	R.MURALIDHAR		26.11.22	APPD.	M.S.S.NAGESH		26.11.22
	NAME											SIGN.	DATE	NO.OF VAR.															
DRN.	RATISH KUMAR												26.11.22																
CHD.	R.MURALIDHAR												26.11.22																
APPD.	M.S.S.NAGESH		26.11.22																										
STATUS OF DRAWING																													
DISTRIBUTION OF PRINTS																													
MANUFACTURER:		<table border="1"> <tr> <td>DEPT.</td> <td>PESD</td> <td>UNTOL. DIM. GR.</td> <td rowspan="2">  </td> <td>SCALE</td> <td>WEIGHT (KG)</td> <td>REF. TO ASSY DRG.</td> <td>ITEM NO.</td> <td>NO.OF ITEMS</td> </tr> <tr> <td>CODE</td> <td>450</td> <td>e/M/F</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										DEPT.	PESD	UNTOL. DIM. GR.		SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS	CODE	450	e/M/F						
DEPT.	PESD	UNTOL. DIM. GR.		SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS																					
CODE	450	e/M/F																											
CUSTOMER PACKAGE CODE		FPS		TITLE: FABRICATION DRAWINGS FOR SECONDARY HYDROCYCLONE FEED STORAGE TANK						DOCUMENT NO		REV.																	
DISCIPLINE										PYCD4M102840603			00																
<table border="1"> <tr> <td>M</td> <td>C</td> <td>E</td> <td>I</td> <td>L</td> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		M	C	E	I	L	✓							SHT No. 01						NO OF SHT. 11									
M	C	E	I	L																									
✓																													

(ALL DIMENSIONS ARE IN mm)

INVENTORY NO	SIGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
			13810105833-S01-R00



Backing Plate BOM		
Backing Plate Sr Nos	Size	QTY
1	4357X50X8THK	02
2	2413X50X8THK	02

NET QUANTITY REQUIRED FOR ONE TANK (BOTTOM)						
S.NO	ITEM	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	BP1	PLATE	IS 2062 Gr E250 B	1500x4361x8Thk	1	410.8
2	BP2	PLATE	IS 2062 Gr E250 B	1100x4354x8Thk	2	601.5
3	BP3	PLATE	IS 2062 Gr E250 B	336x2397x8Thk	2	101.2
TOTAL NET WEIGHT						1114

GROSS QUANTITY REQUIRED FOR ONE TANK (BOTTOM PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	IS 2062 Gr E250 B	1500x6300x8Thk	3	1780
TOTAL GROSS WEIGHT					1780

NOTES:	
1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	PLATE QTY. SHOWN FOR ONE TANK ONLY
4	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING SPEC.
5	ANY MINOR DIMENSIONAL MARKING SHALL BE ADJUSTED AT SITE.
6	ALL THE JOINTS FOR BOTTOM PLATE ARE LAP JOINTS

REFERENCE DRAWINGS	
S.NO.	DRAWING/DOCUMENT
1	PROCESS P&ID FILTRATE WATER TANK
2	GA DRAWING OF FILTRATE WATER TANK
3	FOUNDATION INPUT DETAIL DRAWING OF FILTRATE WATER TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

FOR TENDER PURPOSE ONLY

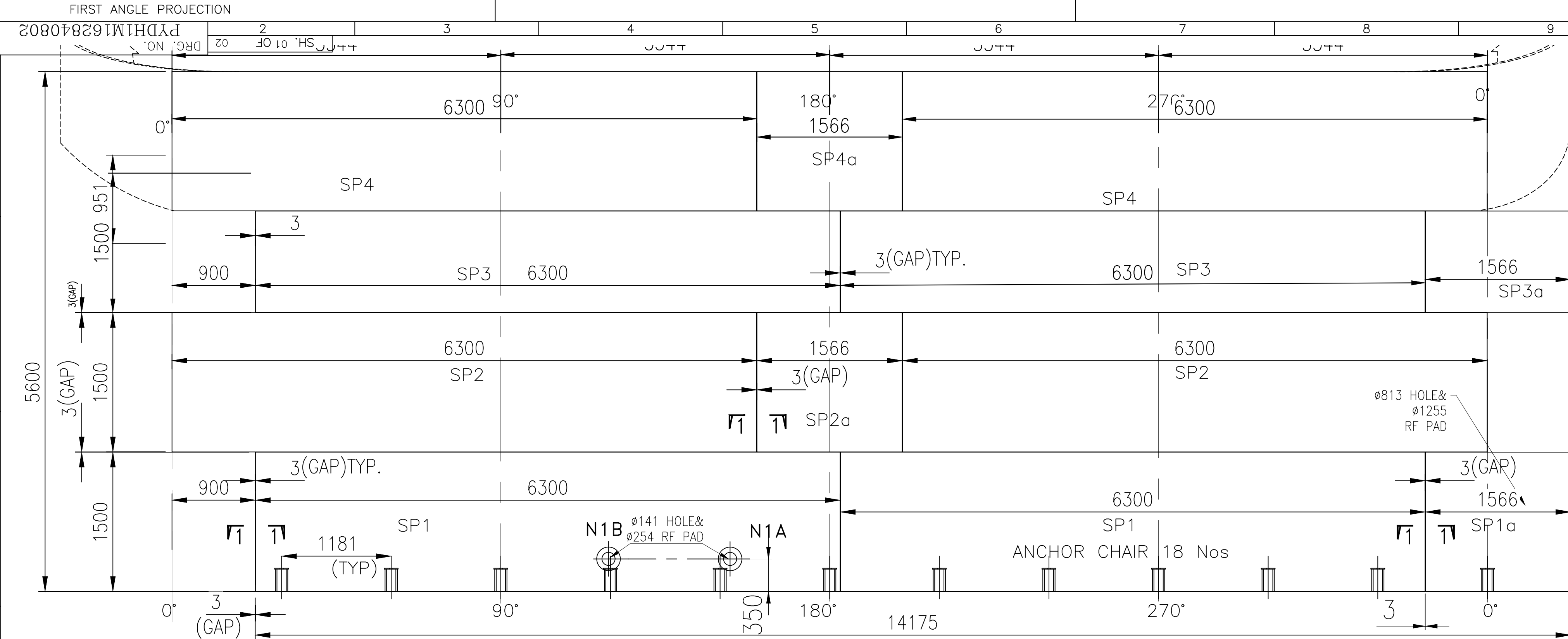
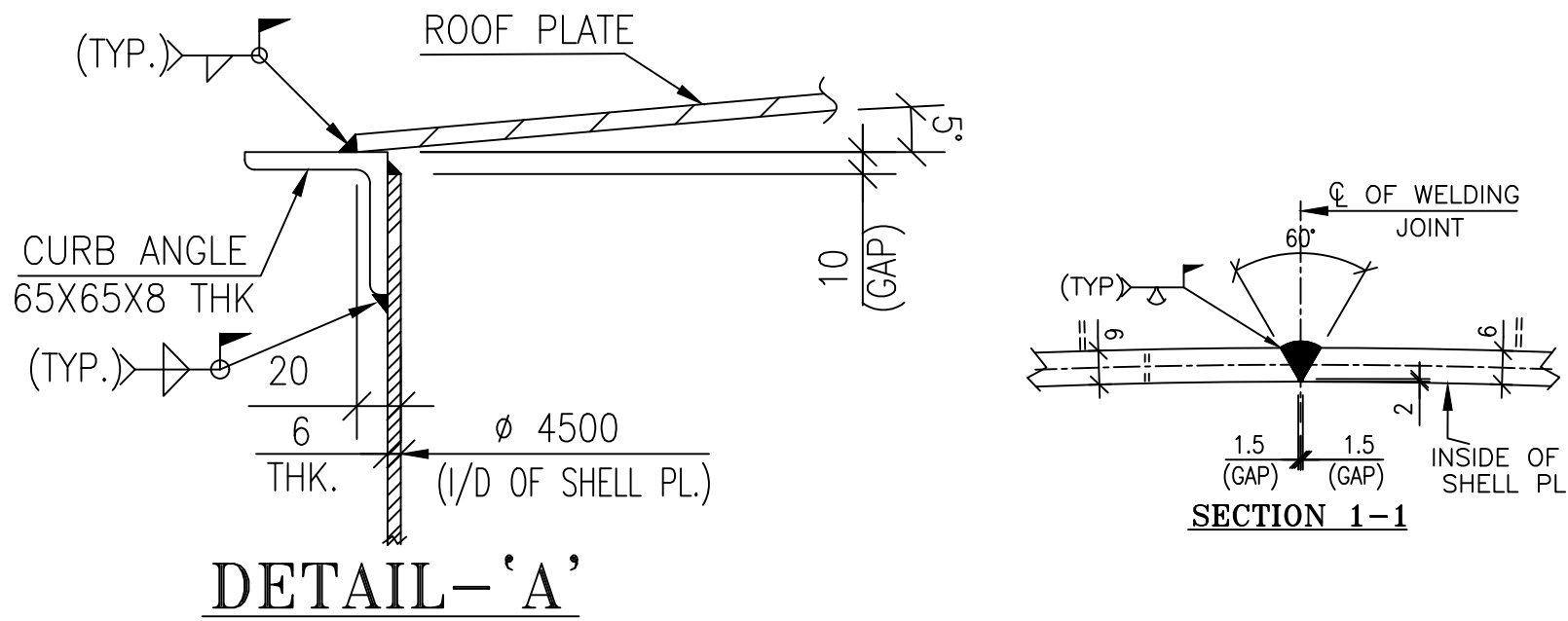
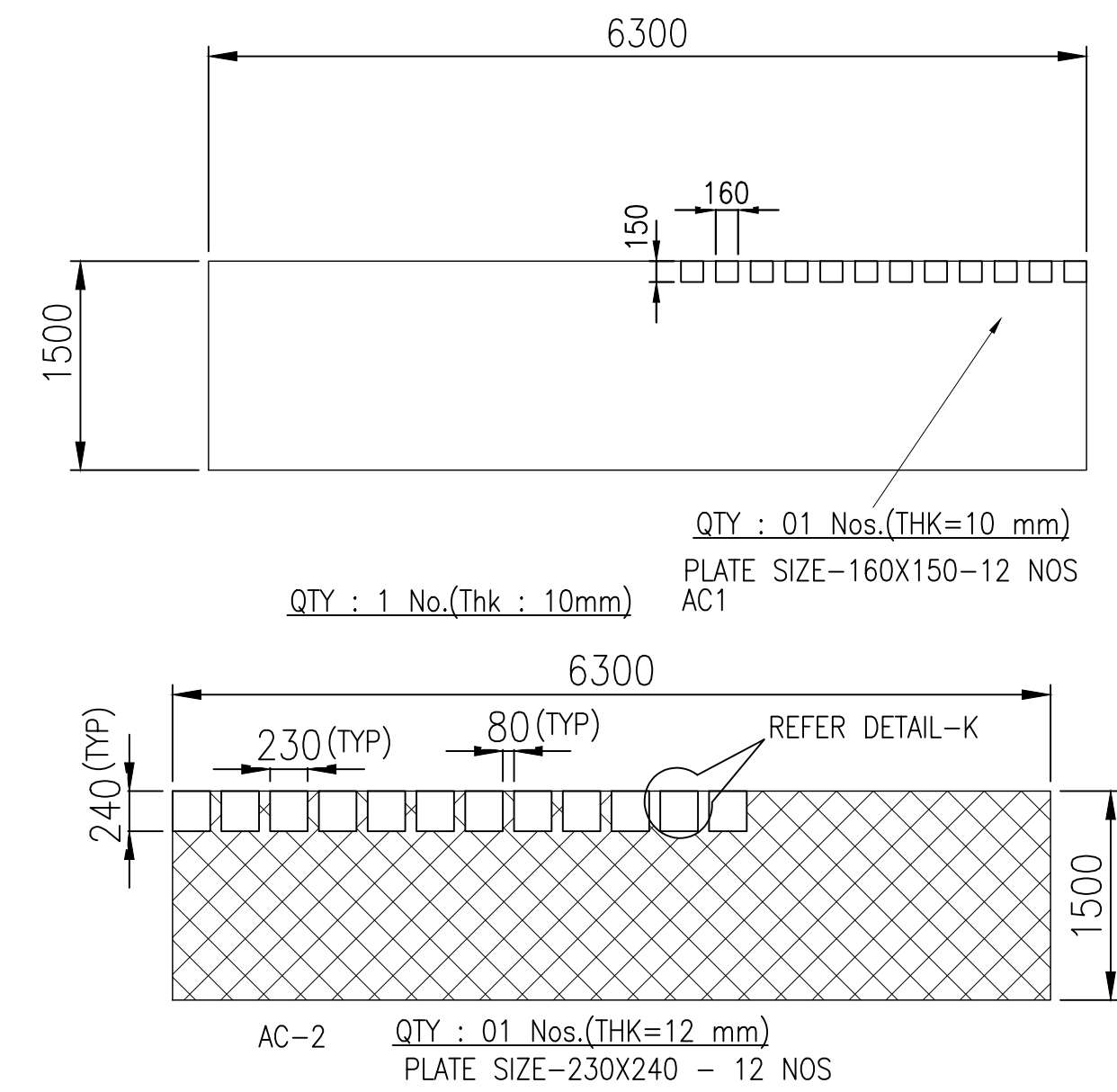
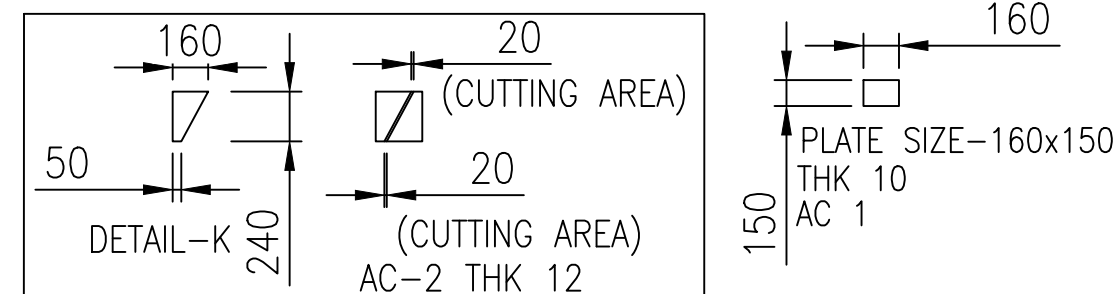
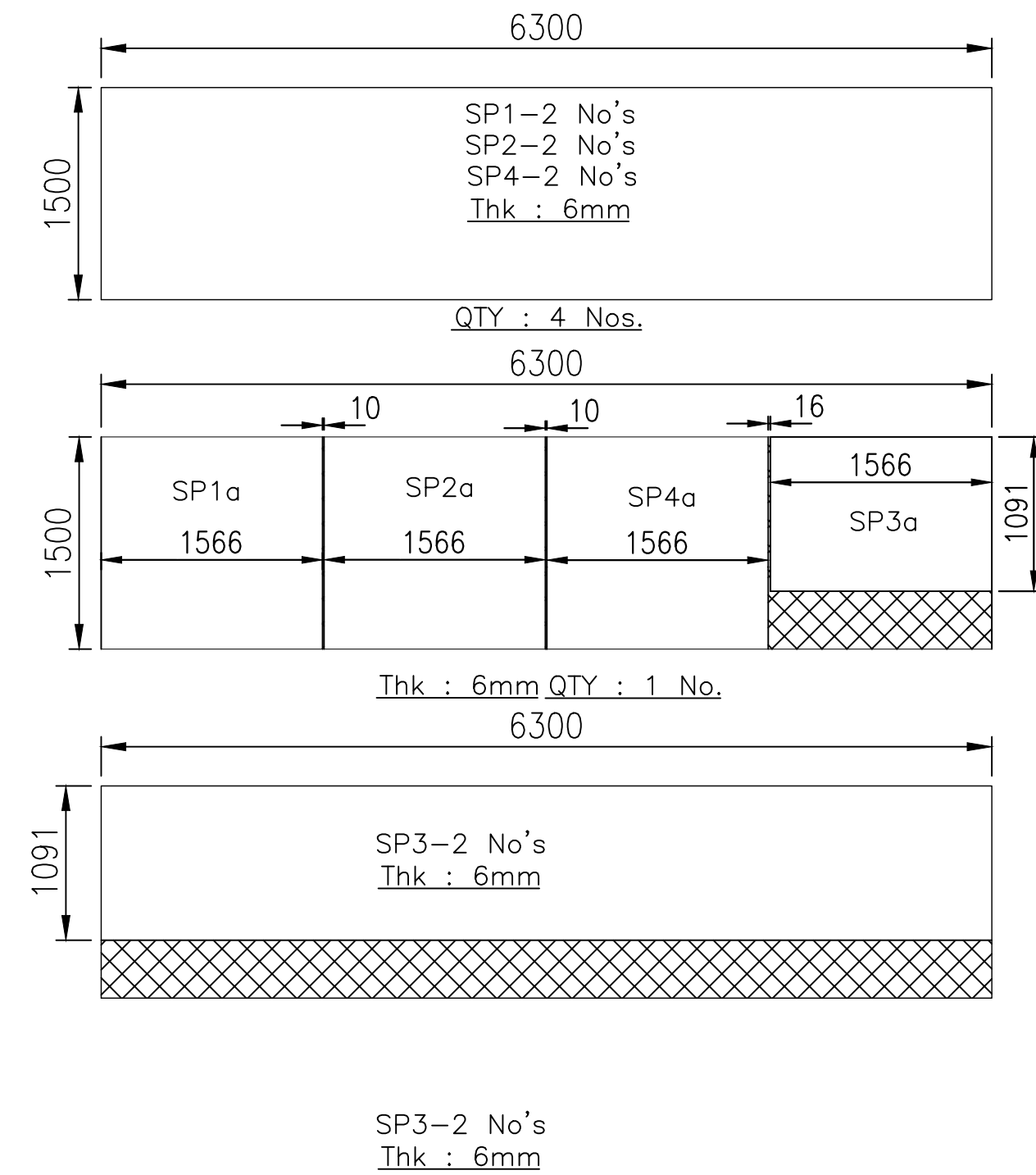
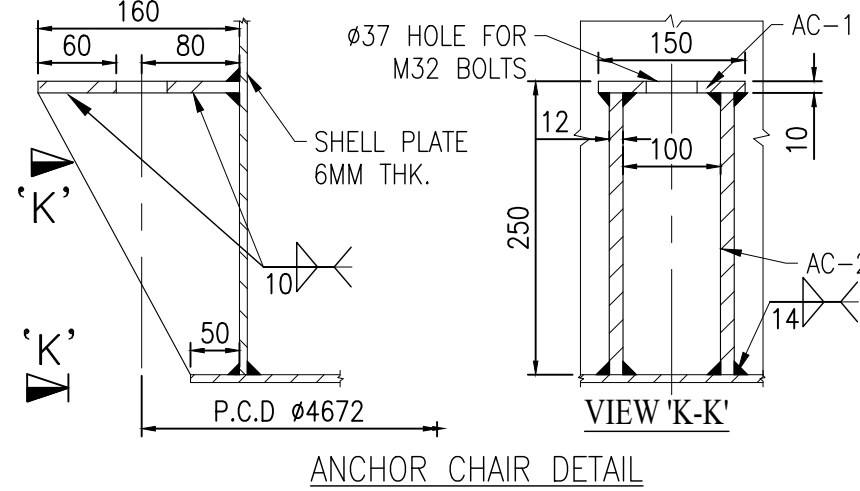
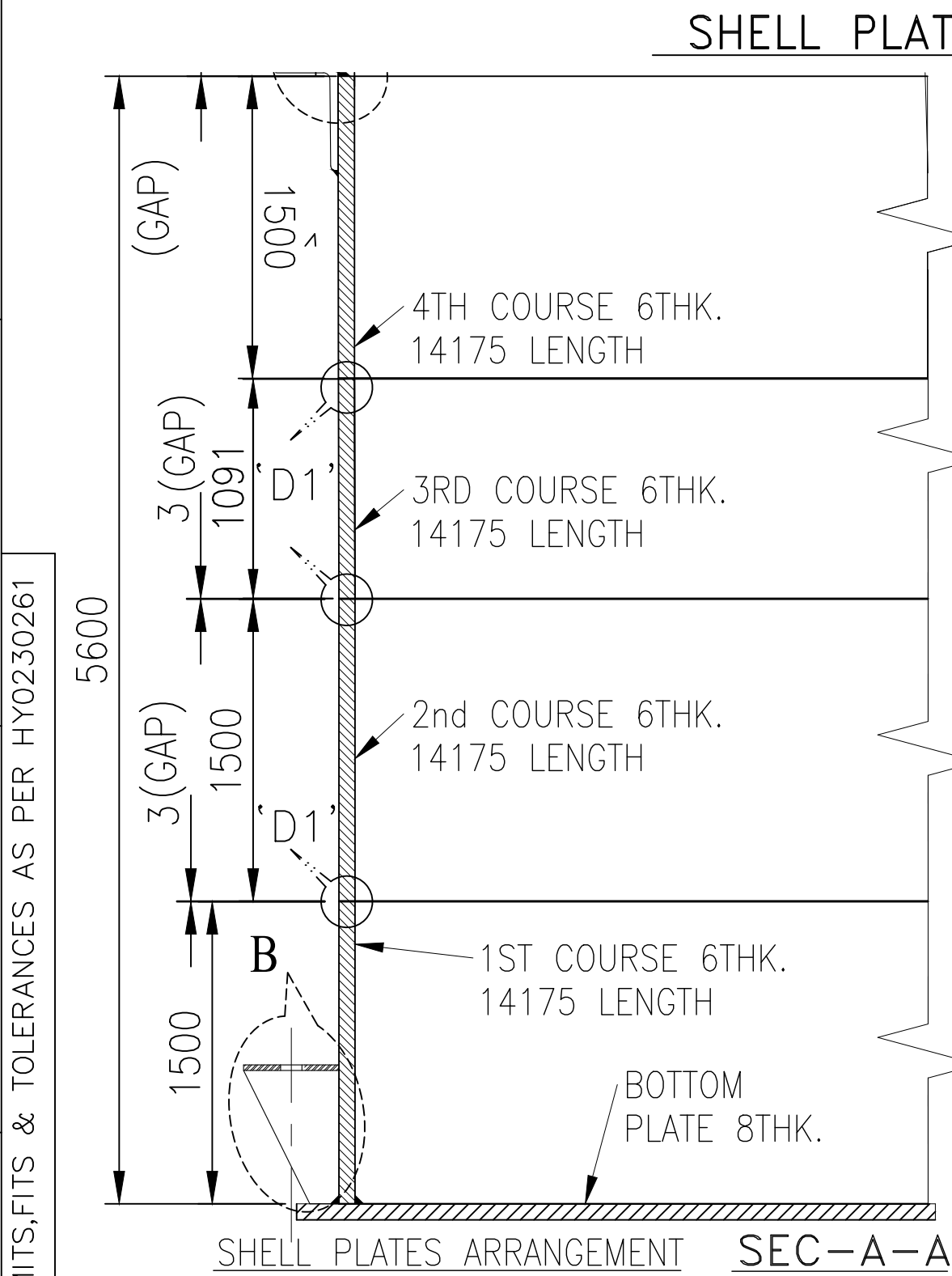
PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT (FGD PACKAGE)
CUSTOMER:	 TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

	BHARAT HEAVY ELECTRICALS LTD.			NAME		SIGN.	DATE	NO. OF VAR.
	HYDERABAD			DRN.	R.MURALIDHAR		07.10.21	
				CHD.	K.N.B.REDDY		07.10.21	
				APPD.	M.S.S. NAGESH		07.10.21	
DEPT. PE&SD CODE 450	UNTOL. DIMS. GR. O/M/F		SCALE NTS	WEIGHT (KG) —N.A.—	REF. TO ASSY. DRG. —N.A.—		ITEM NO. —N.A.—	NO. OF ITEMS —N.A.—
TITLE BOTTOM PLATE CUTTING LAYOUT DRAWING OF SECD. Hydro.				CARD CODE	DRAWING NO. PYDHIM102844101		REV.	00
WATER STORAGE TANK					SHT. No	1	NO. OF SHT.	1

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INVENTORY NO
SIGN. AND DATE
REF. DRG. NO.
COMPUTER FILE NAME
13810105833-S01-R00

JCS
GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261



SHELL PLATES ARRANGEMENT FOR SECD. Hydro. WATER STORAGE TANK(Ø 4.5 Mx 5.6 M HEIGHT)

NET QUANTITY REQUIRED FOR ONE TANK (SHELL PLATE)						
S.NO	ITEM	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	SP1	PLATE	IS 2062 Gr E250 B	1500x6300x6Thk	2	890
2	SP1a	PLATE	IS 2062 Gr E250 B	1500x1566x6Thk	1	111
3	SP2	PLATE	IS 2062 Gr E250 B	1500x6300x6Thk	2	890
4	SP2a	PLATE	IS 2062 Gr E250 B	1500x1566x6Thk	1	111
5	SP3	PLATE	IS 2062 Gr E250 B	740x6300x6Thk	2	439
6	SP3a	PLATE	IS 2062 Gr E250 B	740x1566x6Thk	1	55
7	AC-1	PLATE	IS 2062 Gr E250 B	160x150x10Thk	12	23
8	AC-2	PLATE	IS 2062 Gr E250 B	230x240x16Thk	12	83
9	CURB ANGLE	ANGLE	IS 2062 Gr E250 A	ISA 65x65x8 Thk-14180.24		109
TOTAL NET WEIGHT						2710

GROSS QUANTITY REQUIRED FOR ONE TANK (SHELL PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	IS 2062 Gr E250 B	1500x6300x6Thk	6	2671
2	PLATE	IS 2062 Gr E250 B	740x6300x6Thk	1	220
3	PLATE	IS 2062 Gr E250 B	160x150x10Thk	1	55
4	PLATE	IS 2062 Gr E250 B	230x240x16Thk	1	7
5	ANGLE	IS 2062 Gr E250 A	ISA 65x65x8Thk. - 14180 Lg.		109
TOTAL GROSS WEIGHT					3061

NOTES:	
1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	PLATE QTY. SHOWN FOR ONE TANK ONLY
4	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING SPEC.
5	ANY MINOR DIMENSIONAL MARKING SHALL BE ADJUSTED AT SITE.
6	ALL THE JOINTS FOR BOTTOM PLATE ARE LAP JOINTS

REFERENCE DRAWINGS	
S.NO	DRAWING/DOCUMENT
1	PROCESS P&ID FILTRATE WATER TANK
2	GA DRAWING OF FILTRATE WATER TANK
3	FOUNDATION INPUT DETAIL DRAWING OF FILTRATE WATER TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)
CUSTOMER:	TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

DEPT.	UNTO.	DIMS.	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF
PE&SD	GR.	Ø/M/F	NTS	-N.A.-	-N.A.-	-N.A.-	VAR.
CODE 450							
TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF SECD. Hydro. WATER STORAGE TANK				CARD CODE	DRAWING NO. PYDH1M102844101	REV. 00	
				SHT. No	1	NO. OF SHT.	1

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

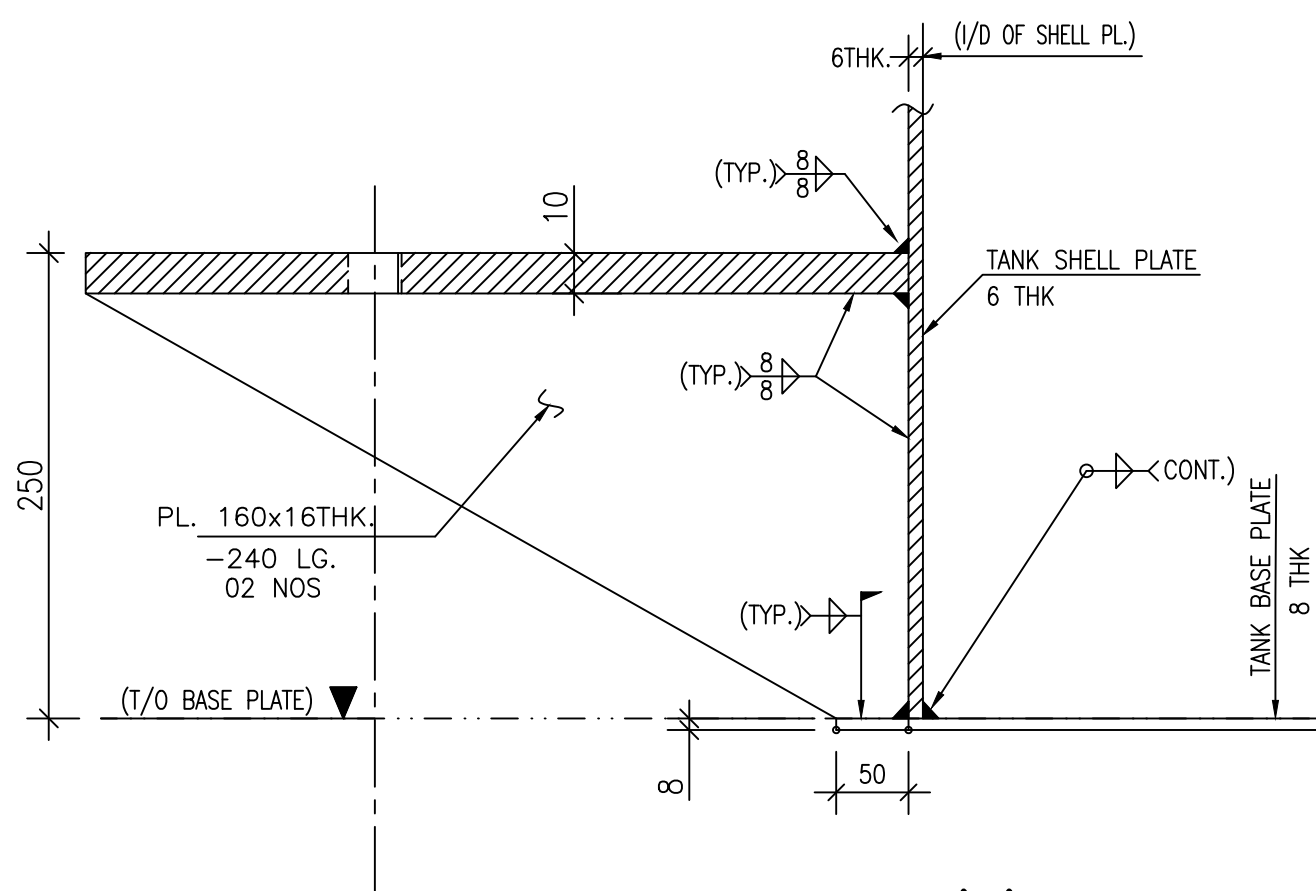


Diagram showing the elevation view of the roof edge detail. The roof plate is shown with a thickness of 10 (GAP) and a width of 20. The curb angle is labeled as 65X65X8 THK. The shell plate is shown with a thickness of 6 THK and a diameter of ϕ 4500. The shell plate is labeled as (1/4 OF SHELL PL.).

DETAIL-'A'

Technical drawing of a storage tank with dimensions and specifications.

Dimensions:

- Overall Diameter: 300
- Inner Diameter: 280
- Overall Height: 200
- Inner Height: 180
- Top Flange Thickness: 22
- Bottom Flange Thickness: 28
- Support Leg Height: 112
- Support Leg Diameter: 166

Specifications:

- NAME OF THE EQUIPMENT:** IS 803/AP1 650
- EDITION:** 10
- NOMINAL DIAMETER:** 4500 MM
- NOMINAL HEIGHT:** 4000 MM
- MAXIMUM CAPACITY:** 64 M³
- DESIGN METAL TEMP:** 58 °C
- NET CAPACITY:** 0.39
- MAXIMUM DESIGN TEMP:** 58 °C
- DESIGN SPECIFIC GRAVITY:** N.A.
- STRESS RELIEF:** N.A.
- DESIGN PRESSURE:** FULL CATH MLC
- WEIGHT WITH WATER:** 10000 KGS
- EMPTY WEIGHT:** 83000 KGS

Labels:

- SECO Hydro WATER STORAGE TANK
- IS 803/AP1 650
- 4500 MM
- 4000 MM
- 64 M³
- 58 °C
- 0.39
- FULL CATH MLC
- 10000 KGS
- 83000 KGS
- 112
- 166
- 22
- 28

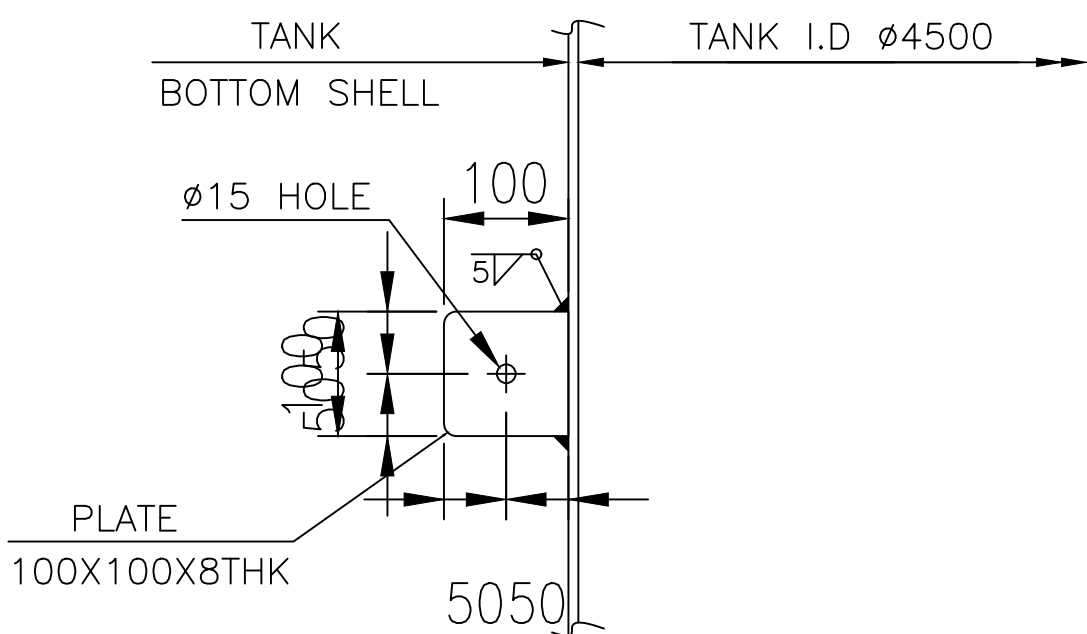
Manufacturer: BHARAT HEAVY ELECTRICALS LIMITED

Material: 2062 GR.E250 BR

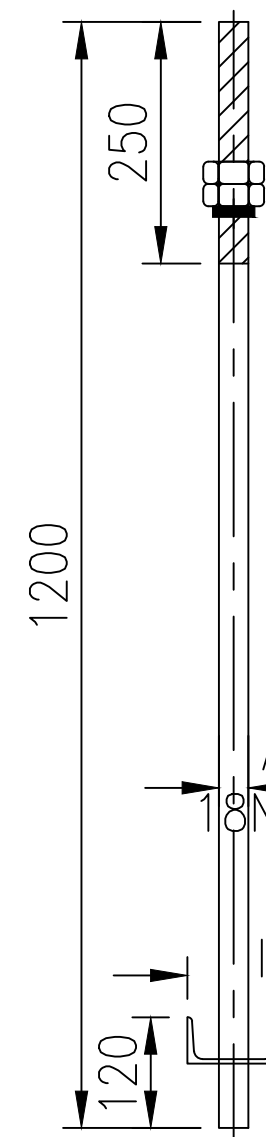
Notes:

- FABRICATED BY
- ERECTED BY
- SHELL COURSE
- ALL COURSES
- REV

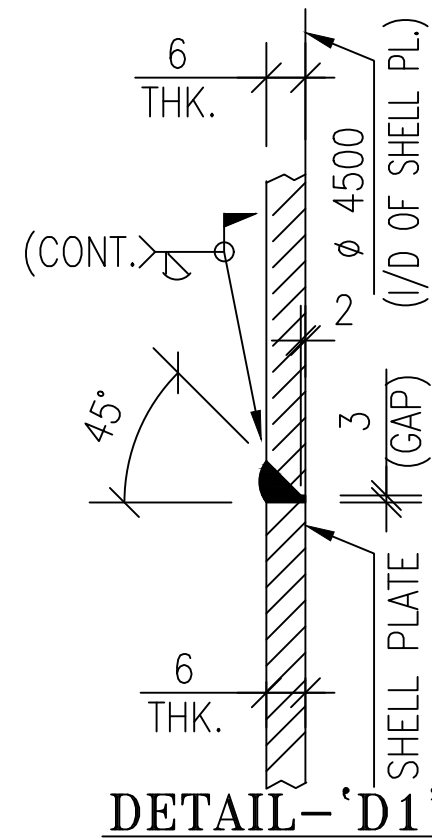
NAME PLATE DETAILS ① R2 R4



DETAIL OF EARTHING STRIP ②



DETAIL OF ANCHOR BOLTS
QTY : 18N0s

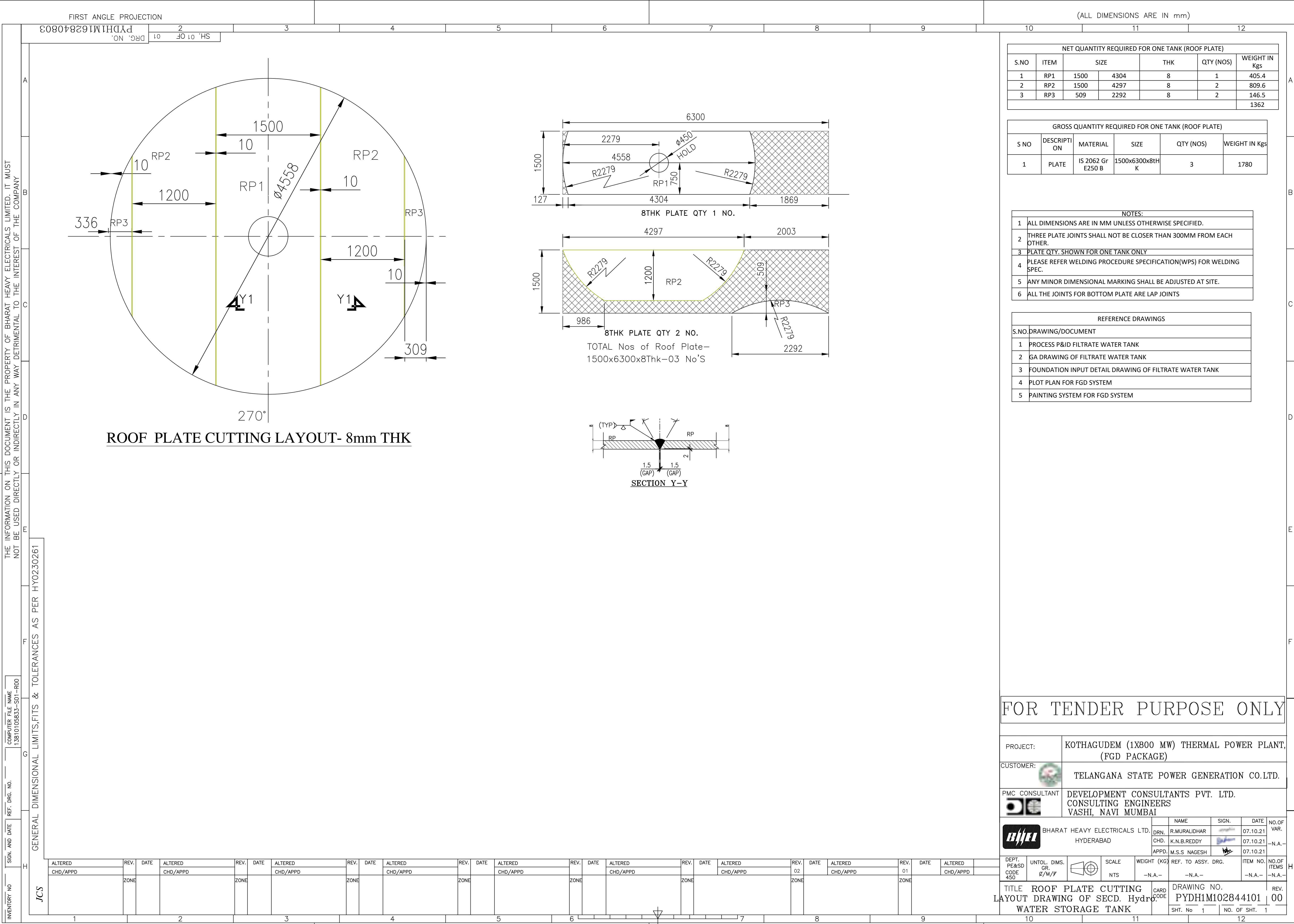


DETAIL-D1

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT (FGD PACKAGE)
CUSTOMER:	 TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

		BHARAT HEAVY ELECTRICALS LTD. HYDERABAD									
		DRN.	R.MURALIDHAR		SIGN.	DATE		NO. OF			
		CHD.	K.N.B.REDDY			07.10.21		V.A.			
		APPD.	M.S.S. NAGESH			07.10.21		N.A.			
DEPT. HEADS CODE 450	UNTL. DIMS. GR. M/F		SCALE NTS	WEIGHT (KG)	REF. TO ASSY. DRG.		ITEM NO.	NO. OF ITEMS			
				—N.A.—	—N.A.—		—N.A.—	—N.A.—			
TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF SECD. Hydro. WATER STORAGE TANK				CARD CODE	DRAWING NO.			REV.			
					PYDHIM62840302			00			
					SHT. No 02	NO. OF SHT. 02					



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COMPUTER FILE NAME
13810105833-S01-ROO

REF. DRG. NO.

SIGN. AND DATE

INVENTORY NO

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

FIRST ANGLE PROJECTION

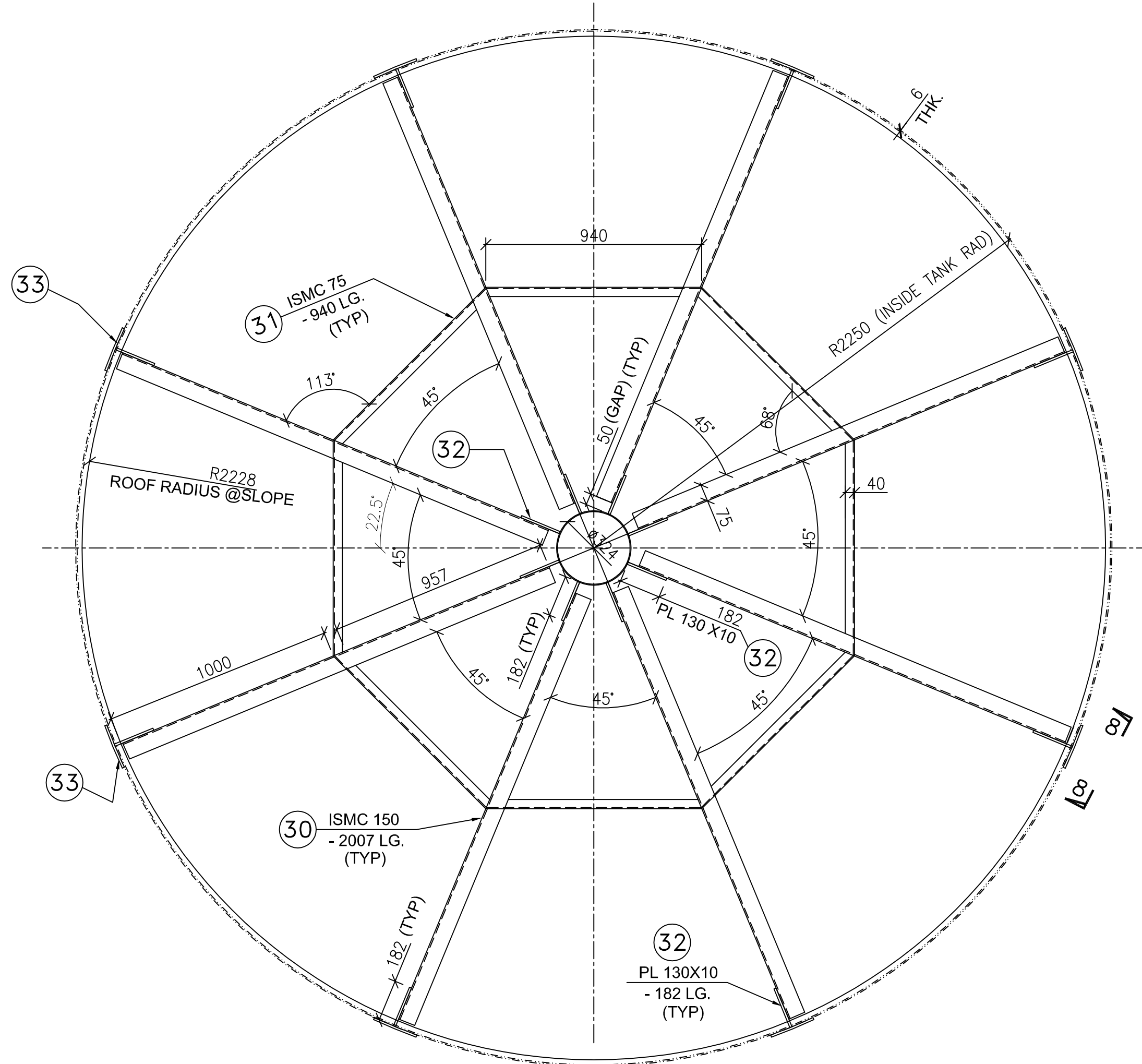
DRG. NO. PYDH1M102844101

(ALL DIMENSIONS ARE IN mm)

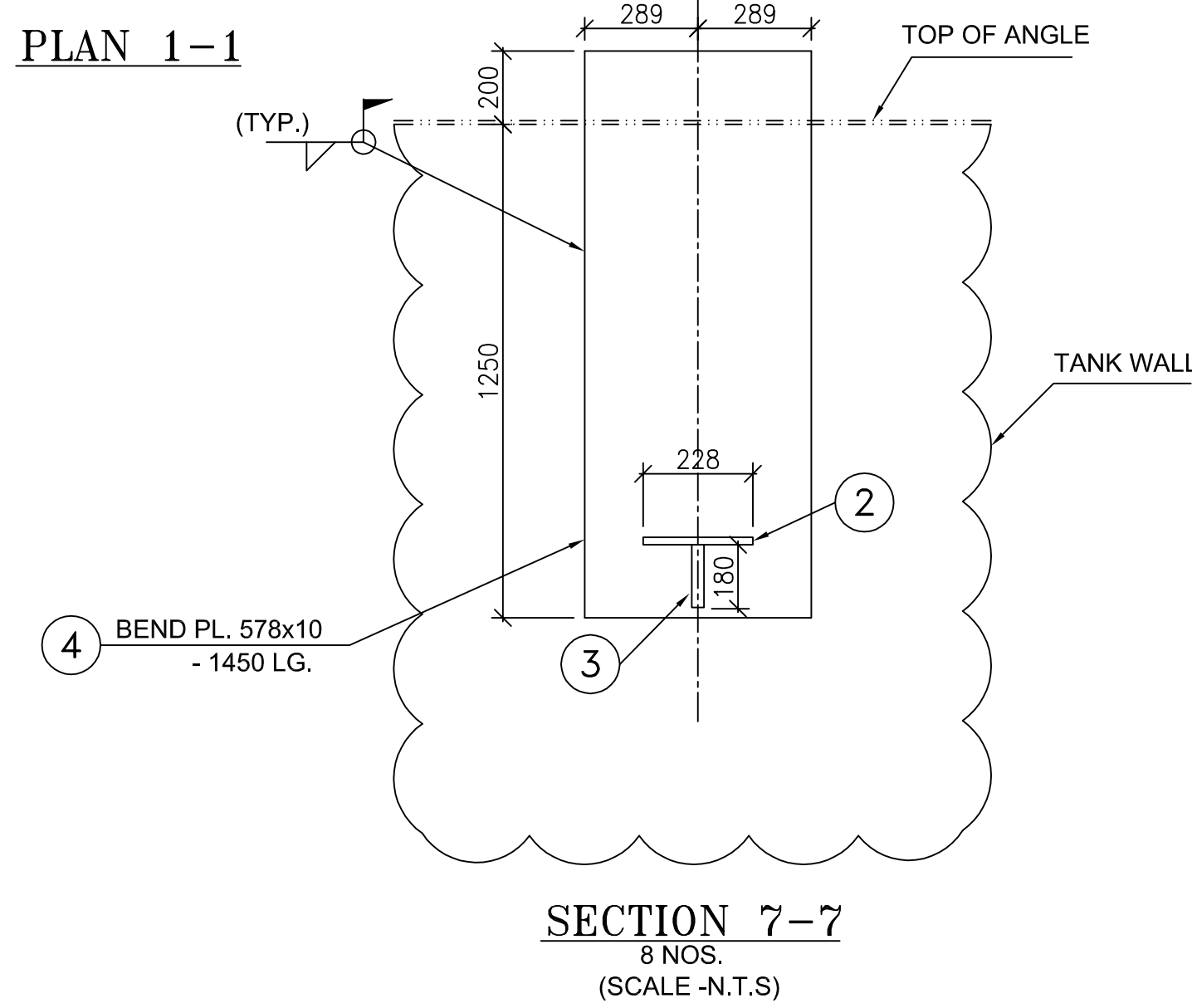
BILL OF MATERIAL FOR PROCESS WATER STORAGE TANK										TOTAL WEIGHT (Kgs)
MARKED NO.	SL. NO.	DESCRIPTION	MATERIAL	SIZE	LENGTH (mm)	QTY	UNIT	WEIGHT		
N1 A - TANK PUMP SUCTION LINE - 200NB	A1	NECK PIPE	IS 3589, Gr Fe 410, ERW	200NB x 6.3THK	400	1	13.24	13.2		
	A2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 485 x ID 222 x 6THK	1	6.9	6.9			
	A3	FLANGE	IS 2062, Gr E 250, BR	200NB #150 SOFF	1	13.7	13.7			
	A4	GASKET	NEOPRENE GASKET	OD 345 x ID 222 x 3THK	1	-	-			
	A5	COUNTER FLANGE	IS 2062, Gr E 250, BR	200NB #150 SOFF	1	13.7	13.7			
N1 B - EMERGENCY QUENCH PUMP SUCTION LINE - 150NB	A6	DIFFUSER	ASTM A234 WPB	200NB x 250NB - Sch.40	1	10.7	10.7			
	A7	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 110Lg	8	0.4	3.1			
	Y1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4THK	400	1	8.52	8.5		
	Y2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK	1	4.8	4.8			
	Y3	FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	1	8.6	8.6			
N1 C/D - TANK EMERGENCY QUENCH PUMP SUCTION LINE - 150NB	Y4	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK	1	-	-			
	Y5	COUNTER FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	1	8.6	8.6			
	Y6	DIFFUSER	ASTM A234 WPB	150NB x 200NB - Sch.40	1	6.5	6.5			
	Y7	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg	8	0.4	2.9			
	X1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4THK	400	2	8.5	17.0		
N2A - MINIMUM FLOW LINE - 80NB	X2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK	2	4.8	9.7			
	X3	FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	2	8.6	17.2			
	X4	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK	2	-	-			
	X5	COUNTER FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	2	8.6	17.2			
	X6	DIFFUSER	ASTM A234 WPB	150NB x 200NB - Sch.40	1	6.5	6.5			
N2B - MINIMUM FLOW LINE - 65NB	X7	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg	16	0.4	6.8			
	B1	NECK PIPE	IS 1239, PART-1 HEAVY	80NB x 4.8THK	400	1	4.0	4.0		
	B2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 265 x ID 92 x 6THK	1	2.3	2.3			
	B3	FLANGE	IS 2062, Gr E 250, BR	80NB #150 SOFF	1	3.7	3.7			
	B4	GASKET	NEOPRENE GASKET	OD 190 x ID 92 x 3THK	1	-	-			
N3 A/B - LIQUID INLET LINE - 150NB	B5	COUNTER FLANGE	IS 2062, Gr E 250, BR	80NB #150 SOFF	1	3.7	3.7			
	B6	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 90Lg	4	0.2	0.8			
	S1	NECK PIPE	IS 1239, PART-1 HEAVY	65NB x 4.5THK	400	1	3.17			
	S2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 200 x ID 76 x 6THK	1	1.3	1.3			
	S3	FLANGE	IS 2062, Gr E 250, BR	65NB #150 SOFF	1	3.2	3.2			
N4 - OVERFLOW LINE - 300NB	S4	GASKET	NEOPRENE GASKET	OD 180 x ID 76 x 3THK	1	-	-			
	S5	COUNTER FLANGE	IS 2062, Gr E 250, BR	300NB #150 SOFF	1	3.2	3.2			
	S6	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 90Lg	4	0.2	0.8			
	C1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4THK	400	2	8.92	17.8		
	C2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK	2	4.8	9.7			
N5 - VENT WITH GOOSE NECK - 150NB	C3	FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	2	8.6	17.2			
	C4	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK	2	-	-			
	C5	COUNTER FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	2	8.6	17.2			
	D1	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg	16	0.4	6.8			
	D1A	NECK PIPE	IS 3589, Gr Fe 410, ERW	300NB x 7.1THK	483	25.8	26.8			
N6 - DRAIN LINE - 100NB	D2	PIPE AFTER FLANGE	IS 3589, Gr Fe 410, ERW	300NB x 7.1THK	407	1	22.6	22.6		
	D3	STIFFENER	IS 2062, Gr E 250, BR	OD 685 x ID 327 x 6THK	1	13.4	13.4			
	D4	COUNTER FLANGE	IS 2062, Gr E 250, BR	300NB #150 SOFF	1	29.0	29.0			
	D5	GASKET	NEOPRENE GASKET	OD 485 x ID 327 x 3THK	1	-	-			
	D6	COUNTER FLANGE	IS 2062, Gr E 250, BR	300NB #150 SOFF	1	29.0	29.0			
N7 - SPARE OUTLET - 200NB	D7	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M24 x 120Lg	12	0.6	7.6			
	D8	PIPE	IS 3589, Gr Fe 410, ERW	300NB x 7.1THK	3705	205.4	205.4			
	D9	ELBOW	ASTM A234 WPB	300NB, 90DEG L.R. B.W	1	58.2	58.2			
	D10	PAD PLATE	IS 2062, Gr E 250, BR	150 x 150 x 6THK	4	1.05975	4.2			
	D11	ISMC 100	IS 2062, Gr E 250, A	1400 Lg	2	9.2	18.4			
N8 - SPARE INLET - 150NB	D12	ISMC 75	IS 2062, Gr E 250, A	1000 Lg	2	6.8	13.6			
	D13	PAD PLATE FOR PIPE	IS 2062, Gr E 250, BR	200 x 200 x 8THK	2	2.512	5.0			
	D14	BASE PLATE ON PIPE	IS 2062, Gr E 250, BR	150 x 150 x 8THK	2	1.413	2.8			
	D15	STIFFENERS	IS 2062, Gr E 250, BR	140 x 140 x 8T	4	1.23088	4.9			
	D16	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 90Lg	2	0.5	1.0			
N9 - LEVEL INSTRUMENT - 80NB	E1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4THK	250	1	4.24	4.2		
	E2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK	1	4.8	4.8			
	E3	ELBOW	ASTM A234 WPB	150NB, 90DEG SCH.40 L.R. B.W	2	10.2	20.4			
	E4	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4THK	450	1	9.54	9.5		
	E5	FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	1	8.6	8.6			
M1 - SHELL MANHOLE - 600NB	E6	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK	1	-	-			
	E7	COUNTER FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	1	8.6	8.6			
	F1	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg	8	0.4	3.1			
	F2	TOP PLATE	IS 2062, Gr E 250, BR	540 x 520 x 8THK	1	31.2	31.2			
	F3	BOTTOM PLATE	IS 2062, Gr E 250, BR	540 x 864 x 8THK	1	29.30	29.3			
M2 - ROOF MANHOLE - 600NB	F4	SIDE PLATE	IS 2062, Gr E 250, BR	500 x 920 x 8THK	2	28.9	57.8			
	F5	FLANGE PLATE-1	IS 2062, Gr E 250, BR	650 x 67 x 8THK	2	2.7	5.5			
	F6	FLANGE PLATE-2	IS 2062, Gr E 250, BR	516 x 67 x 8THK	2	2.2	4.3			
	F7	COVER PLATE	IS 2062, Gr E 250, BR	650 x 650 x 8THK	1	26.5	26.5			
	F8	GASKET	NEOPRENE GASKET	OD 650 x ID 516 x 3THK	1	0	0			
N10 - TANK PUMP SUCTION LINE - 200NB	F9	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 60Lg	24	0.2	4.8			
	F10	RF PAD PLATE	IS 2062, Gr E 250, BR	978 x 740 x 8THK	1	28.1	28.1			
	F11	STIFFENER	IS 2062, Gr E 250, BR	32 x 920 x 8THK	4	1.85	7.4			
	F12	PIPE	IS 1239, PART-1 HEAVY	100NB x 5.4THK	200	1	2.98	3.0		
	F13	HINGE ROD	IS 2062, Gr E 250, BR	100NB #150 SOFF	1	5.9	5.9			
N11 - TANK PUMP SUCTION LINE - 150NB	F14	GASKET	NEOPRENE GASKET	OD 230 x ID 117 x 3THK	2	-	-			
	F15	COUNTER FLANGE	IS 2062, Gr E 250, BR	100NB #150 SOFF	1	5.9	5.9			
	F16	STUD BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 160Lg	8	0.6	4.8			
	F17	HINGE ROD	IS 2062, Gr E 250, BR	100NB #150 SOFF	1	0.47	0.5			
	F18	ELBOW	ASTM A234 WPB	100NB, 90DEG SCH.40 L.R. B.W	1	3.9	3.9			
N12 - TANK PUMP SUCTION LINE - 100NB	G1	NECK PIPE	IS 3589, Gr Fe 410, ERW	200NB x 6.3THK	400	1	13.3	13.3		
	G2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 485 x ID 222 x 6THK	1	6.9	6.9			
	G3	FLANGE	IS 2062, Gr E 250, BR	200NB #150 SOFF	1	13.7	13.7			
	G4	GASKET	NEOPRENE GASKET	OD 345 x ID 222 x 3THK	1	-	-			
	G5	BLIND FLANGE	IS 2062, Gr E 250, BR	200NB #150 BLFF	1	20.5	20.5			
N13 - TANK PUMP SUCTION LINE - 80NB	G6	DIFFUSER	ASTM A234 WPB	200NB x 250NB - Sch.40	1	10.7	10.7			
	G7	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 115Lg	8	0.4	3.1			
	H1	NECK PIPE	IS 1239, PART-1 HEAVY	150NB x 5.4THK	400	1	8.52	8.5		
	H2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 400 x ID 171 x 6THK	1	4.8	4.8			
	H3	FLANGE	IS 2062, Gr E 250, BR	150NB #150 SOFF	1	8.6	8.6			
N14 - TANK PUMP SUCTION LINE - 65NB	H4	GASKET	NEOPRENE GASKET	OD 280 x ID 171 x 3THK	1	-	-			
	H5	BLIND FLANGE	IS 2062, Gr E 250, BR	150NB #150 BLFF	1	11.8	11.8			
	H6	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 100Lg	8	0.4	2.9			
	I1	NECK PIPE	IS 1239, PART-1 HEAVY	80NB x 4.8THK	300	1	2.97	3.0		
	I2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 265 x ID 92 x 6THK	1	2.3	2.3			
N15 - TANK PUMP SUCTION LINE - 50NB	I3	FLANGE	IS 2062, Gr E 250, BR	80NB #150 SOFF	1	3.7	3.7			
	I4	GASKET	NEOPRENE GASKET	OD 190 x ID 92 x 3THK	1	-	-			
	I5	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 90Lg	4	0.2	0.8			
	J1	NECK PIPE	IS 1239, PART-1 HEAVY	1898 x 200 x 6THK	1	17.9	17.9			
	J2	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 1255 x ID 613 x 6THK	1	44.3	44.3			
N16 - TANK PUMP SUCTION LINE - 40NB	J3	GASKET	NEOPRENE GASKET	OD 832 x ID 610 x 3THK	1	-	-			
	J4	COVER PLATE	IS 2062, Gr E 250, BR	DIA 832 x 10THK	1	42.7	42.7			
	J5	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M20 x 60Lg	28	0.43	12.0			
	J6	HANDLE	IS 2062, Gr E 250, A	ISRO 16	300	2	0.48	1.0		
	J7	FLANGE PLATE	IS 2062, Gr E 250, BR	OD 832 x ID 613 x 8THK	1	15.6	15.6			
N17 - TANK PUMP SUCTION LINE - 30NB	J8	NECK PIPE	IS 2062, Gr E 250, BR	1984 x 210 x 6THK	1	18.9	18.9			
	J9	FLANGE PLATE	IS 2062, Gr E 250, BR	OD 762 x ID 613 x 6THK	1	7.5	7.5			
	R3	GASKET	NEOPRENE GASKET	OD 762 x ID 612 x 3THK	1	-	-			
	R4	COVER PLATE	IS 2062, Gr E 250, BR	DIA 762 x 6THK	1	23.5	23.5			
	R5	BOLTS & NUTS	IS 1367 CL 4.6 / 4.0 GALV	M16 x 60Lg	20	0.4	8.0			
N18 - TANK PUMP SUCTION LINE - 20NB	R6	HANDLE	IS 2062, Gr E 250, A	ISRO 16	300	2	0.48	1.0		
	R7	RF PAD PLATE	IS 2062, Gr E 250, BR	OD 1150 x ID 625 x 6THK	1	34.5	34.5			
	TOTAL WEIGHT IN KGS									1328.0

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUEDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)			
CUSTOMER:	TELANGANA STATE POWER GENERATION CO.LTD.			
PMC CONSULTANT:	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI			
DEPT. PE&SD CODE 450	UNTOOL. DIMS. GR. 8/M/9	SCALE NTS	WEIGHT (KG) REF. TO ASSY. DRG. -N.A.-	ITEM NO. -N.A.-
TITLENOSZZLE DETAIL DRAWING SECD. Hydro. WATER STORAGE TANK		DRAWING NO. PYDH1M1028441		

[illegible]

ROOF STRUCTURE PLAN
PLAN 2-2



33 BEND PL. 200x10
- 550 LG.

100, 100

200

350

(TYP.)

TOP OF ANGLE

TANK WALL

SECTION 8-8
8 NOS.
(SCALE - N.T.S.)

NOTES:—

~~1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN MM~~

FOR TENDER PURPOSE ONLY

PROJECT:		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT (FGD PACKAGE)									
CUSTOMER:		 TELANGANA STATE POWER GENERATION CO.LTD.									
PMC CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI									
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME DRN. R.MURALIDHAR C.N.B.REDDY APPD. M.S.S. NAGESH		SIGN.   		DATE 07.10.21 07.10.21 07.10.21		NO. OF VAR. N.A. N.A. N.A.			
DEPT. PEASO CODE	UNTO. GR. C/N/I		SCALE NTS	WEIGHT (KG)	REF. TO ASST. DRG.	ITEM NO.	NO. OF ITEMS				
				-N.A.-	-N.A.-	-N.A.-	-N.A.-				
TITLE				CARD CODE	DRAWING NO. PYDHIM02844101			REV.			
ARRANGEMENT OF SECD. HYDRO. TANK								00			
				SHT. NO	1	NO. OF SHT.		1			

FABRICATION DRAWINGS FOR WASTE WATER STORAGE TANK

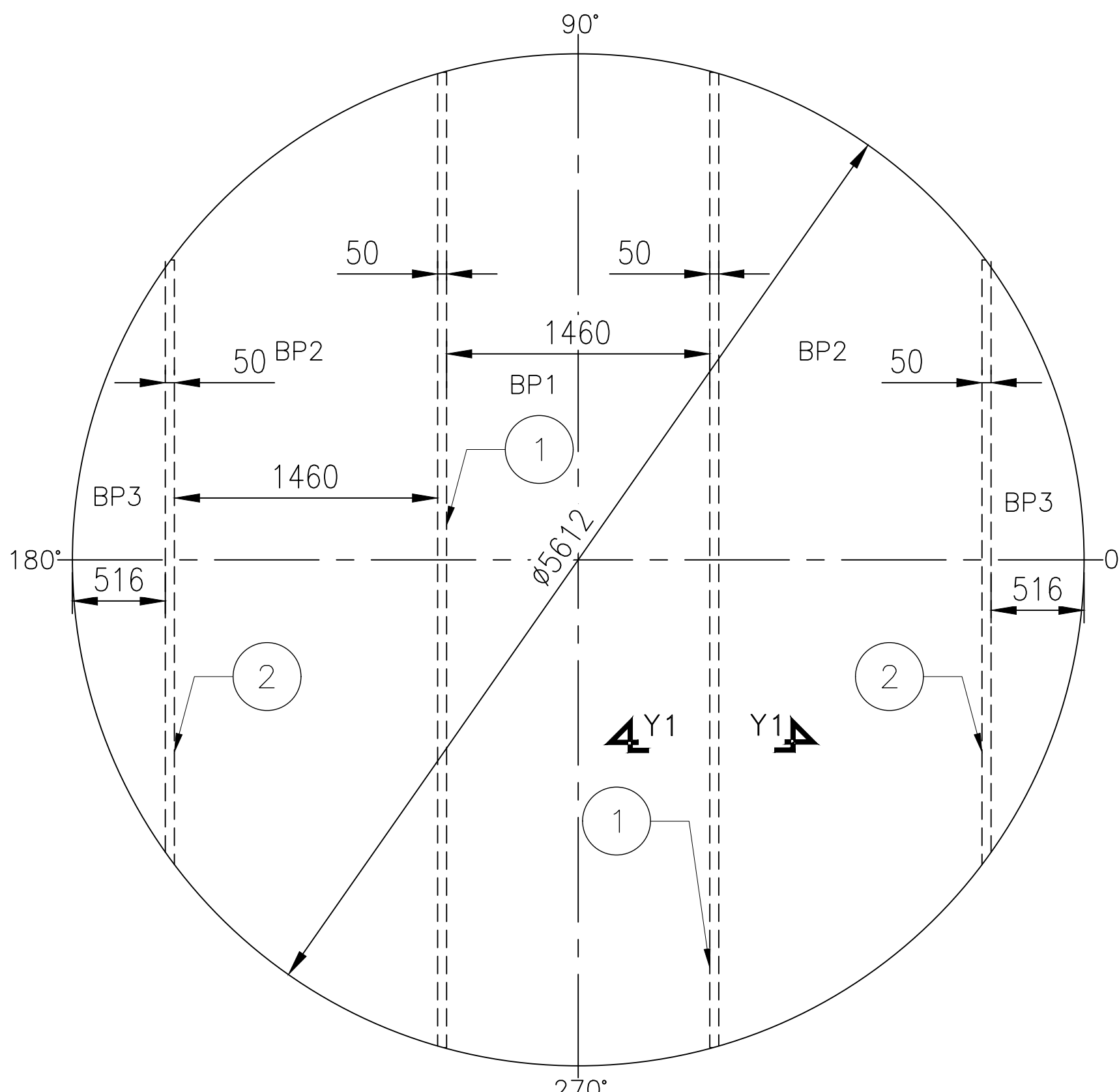
FOR TENDER PURPOSE ONLY

LIST OF DRAWINGS:

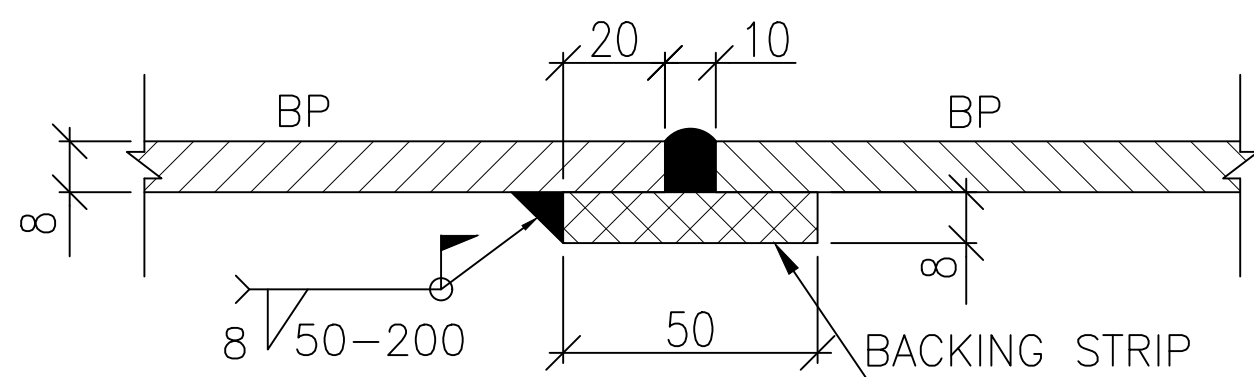
1. BOTTOM PLATE CUTTING LAYOUT
2. SHELL PLATE CUTTING LAYOUT
3. ROOF PLATE CUTTING LAYOUT
4. CORNER PLATE DETAIL DRAWING
5. STAIRCASE DETAIL DRAWING
6. NOZZLE DETAIL DRAWING
7. AGITATOR & ROOF STRUCTURE DETAIL DRAWING

00	17.05.23	INITIAL SUBMISSION																											
REV	DATE	DESCRIPTION																											
PROJECT		KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)																											
CUSTOMER		 TELANGANA STATE POWER GENERATION CO.LTD.																											
CONSULTANT		 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS, VASHI, NAVI MUMBAI.																											
ADDITIONAL INFORMATION		 BHARAT HEAVY ELECTRICALS LTD. PE & SD HYDERABAD <table border="1"> <thead> <tr> <th></th> <th>NAME</th> <th>SIGN.</th> <th>DATE</th> <th>NO.OF VAR.</th> </tr> </thead> <tbody> <tr> <td>DRN.</td> <td>RATISH KUMAR</td> <td></td> <td>01.12.22</td> <td rowspan="3"></td> </tr> <tr> <td>CHD.</td> <td>R.MURALIDHAR</td> <td></td> <td>01.12.22</td> </tr> <tr> <td>APPD.</td> <td>M.S.S.NAGESH</td> <td></td> <td>01.12.22</td> </tr> </tbody> </table>											NAME	SIGN.	DATE	NO.OF VAR.	DRN.	RATISH KUMAR		01.12.22		CHD.	R.MURALIDHAR		01.12.22	APPD.	M.S.S.NAGESH		01.12.22
	NAME											SIGN.	DATE	NO.OF VAR.															
DRN.	RATISH KUMAR												01.12.22																
CHD.	R.MURALIDHAR												01.12.22																
APPD.	M.S.S.NAGESH		01.12.22																										
STATUS OF DRAWING																													
DISTRIBUTION OF PRINTS																													
MANUFACTURER:		<table border="1"> <tr> <td>DEPT.</td> <td>PESD</td> <td>UNTOL. DIM. GR.</td> <td rowspan="2">  </td> <td>SCALE</td> <td>WEIGHT (KG)</td> <td>REF. TO ASSY DRG.</td> <td>ITEM NO.</td> <td>NO.OF ITEMS</td> </tr> <tr> <td>CODE</td> <td>450</td> <td>e/M/F</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										DEPT.	PESD	UNTOL. DIM. GR.		SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS	CODE	450	e/M/F						
DEPT.	PESD	UNTOL. DIM. GR.		SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS																					
CODE	450	e/M/F																											
CUSTOMER PACKAGE CODE		FPS		TITLE: FABRICATION DRAWINGS FOR WASTE WATER STORAGE TANK						DOCUMENT NO PYDH1M162844501		REV. 00																	
DISCIPLINE		<table border="1"> <tr> <td>M</td> <td>C</td> <td>E</td> <td>I</td> <td>L</td> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>								M	C	E	I	L	✓					SHT No. 01		NO OF SHT. 01							
M	C	E	I	L																									
✓																													

(ALL DIMENSIONS ARE IN mm)



BACKING STRIP LAYOUT



6300

1500

8 THK PLATE QTY 1 NOs
(BACKING PLATE FOR FWT & WWT
ROOF AND BOTTOM PL)

NET QUANTITY REQUIRED FOR ONE TANK (BOTTOM)						
S.NO	ITEM	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	BP1	PLATE	S 2062 Gr E250 B	1500x5612x8Thk	1	528.65
2	BP2	PLATE	S 2062 Gr E250 B	1500x5402x8Thk	2	1017.74
3	BP3	PLATE	S 2062 Gr E250 B	536x3299x8Thk	2	222.09
TOTAL NET WEIGHT						1768

GROSS QUANTITY REQUIRED FOR ONE TANK (BOTTOM PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs
1	PLATE	S 2062 Gr E250 B	1500x6300x8Thk	4	2374
TOTAL GROSS WEIGHT					2374

1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	PLATE QTY. SHOWN FOR ONE TANK ONLY
4	PLEASE REFER WELDING PROCEDURE SPECIFICATION(WPS) FOR WELDING SPEC
5	ANY MINOR DIMENSIONAL MARKING SHALL BE ADJUSTED AT SITE.
6	ALL THE JOINTS FOR BOTTOM PLATE ARE LAP JOINTS

REFERENCE DRAWINGS	
S.NO.	DRAWING/DOCUMENT
1	PROCESS P&ID AUXILIARY ABSORBENT TANK
2	GA DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
3	FOUNDATION INPUT DETAIL DRAWING OF AUXILIARY ABSORBENT STORAGE TANK
4	PLOT PLAN FOR FGD SYSTEM
5	PAINTING SYSTEM FOR FGD SYSTEM

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUEDEM (1X800 MW) THERMAL POWER PLANT (FGD PACKAGE)
CUSTOMER:	 TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

	BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME	SIGN.	DATE	NO.OF VAR.
		DRN.	R.MURALIDHAR		07.10.21	
		CHD.	K.N.B.REDDY		07.10.21	-N.A.-

				APPD.	M.S.S. NAGESH		07.10.21
DEPT. PE&SD CODE	UNTOL. DIMS. GR. Q/M/P		SCALE NTS	WEIGHT (KG) N/A	REF. TO ASSY. DRG. N/A	ITEM NO. N/A	NO.OF ITEMS N/A

[illegible]

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

SIGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
		13810105833-S01-R00

100

INVENTORY NO	DATE	DESCRIPTION	QTY	UNIT PRICE	TOTAL
1	10/1/20	1000	1000	1000	1000
2	10/2/20	1000	1000	1000	1000
3	10/3/20	1000	1000	1000	1000
4	10/4/20	1000	1000	1000	1000
5	10/5/20	1000	1000	1000	1000
6	10/6/20	1000	1000	1000	1000
7	10/7/20	1000	1000	1000	1000
8	10/8/20	1000	1000	1000	1000
9	10/9/20	1000	1000	1000	1000
10	10/10/20	1000	1000	1000	1000
11	10/11/20	1000	1000	1000	1000
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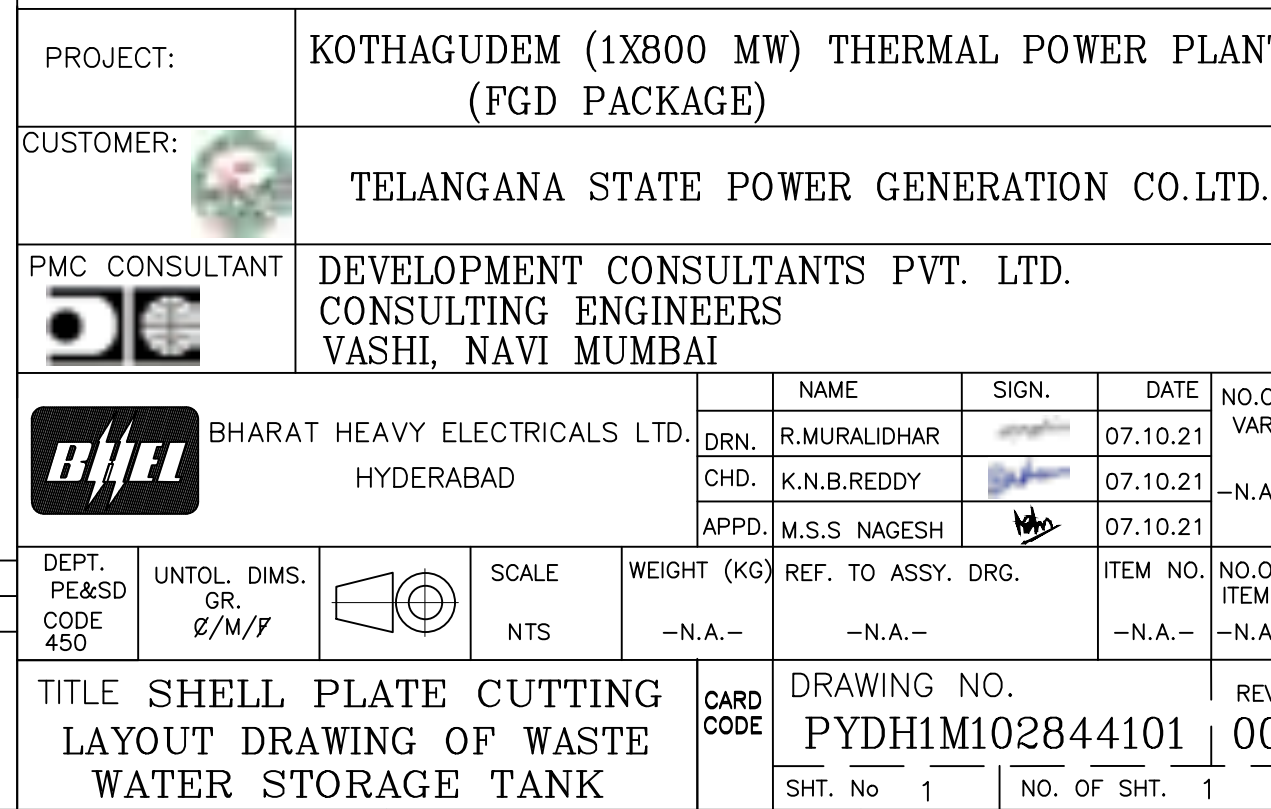


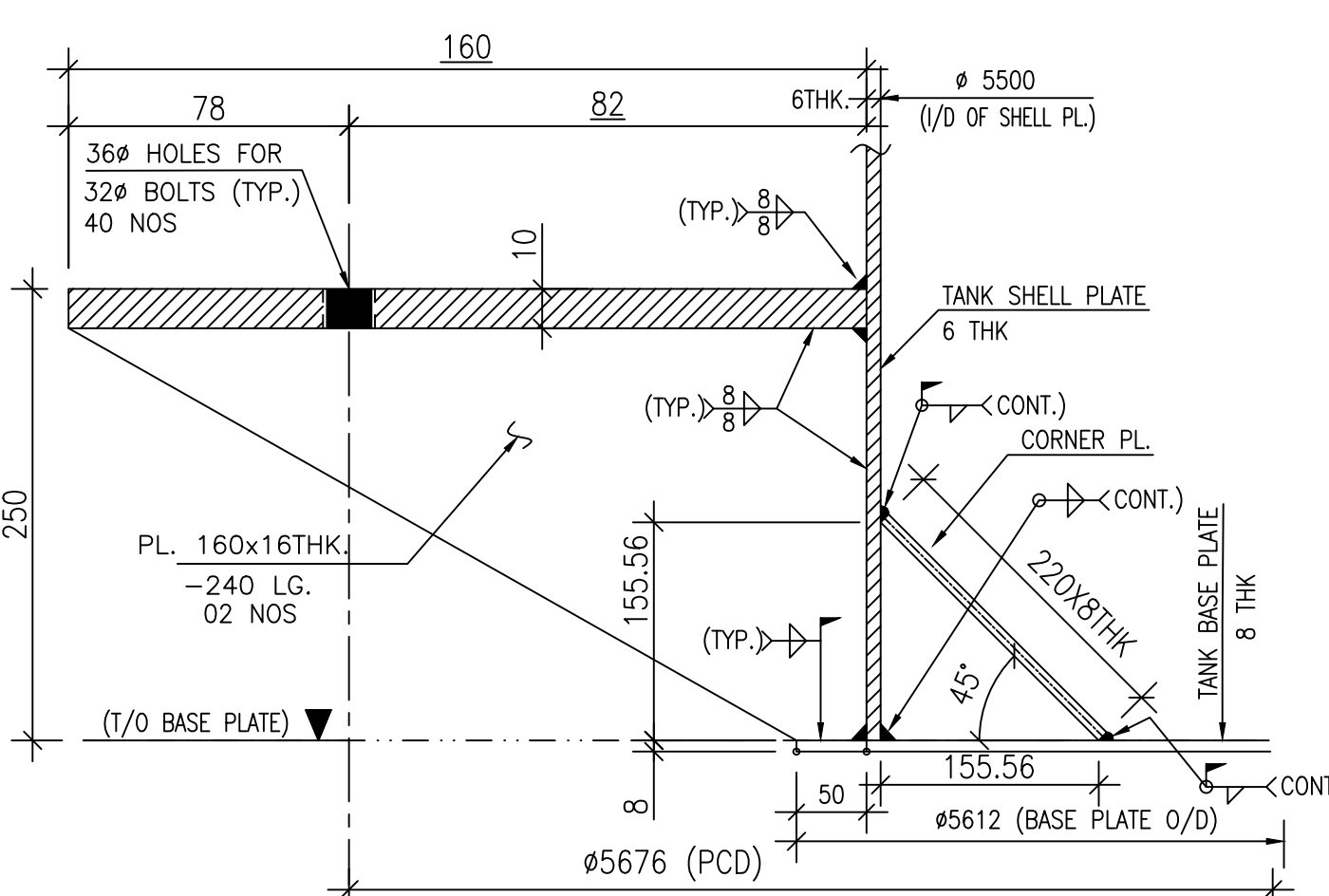
GROSS QUANTITY REQUIRED FOR ONE TANK (SHELL PLATE)					
S NO	DESCRIPTION	MATERIAL	SIZE	QTY (NOS)	WEIGHT IN Kgs

NOTES:	
1	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2	THREE PLATE JOINTS SHALL NOT BE CLOSER THAN 300MM FROM EACH OTHER.
3	ADJUSTMENT SHALL BE DONE ON THE LAST SPOOL PIECE, IF REQUIRED TO MAINTAIN TOTAL DESIRED LENGTH.
4	PLATE QTY. SHOWN FOR ONE TANK ONLY.

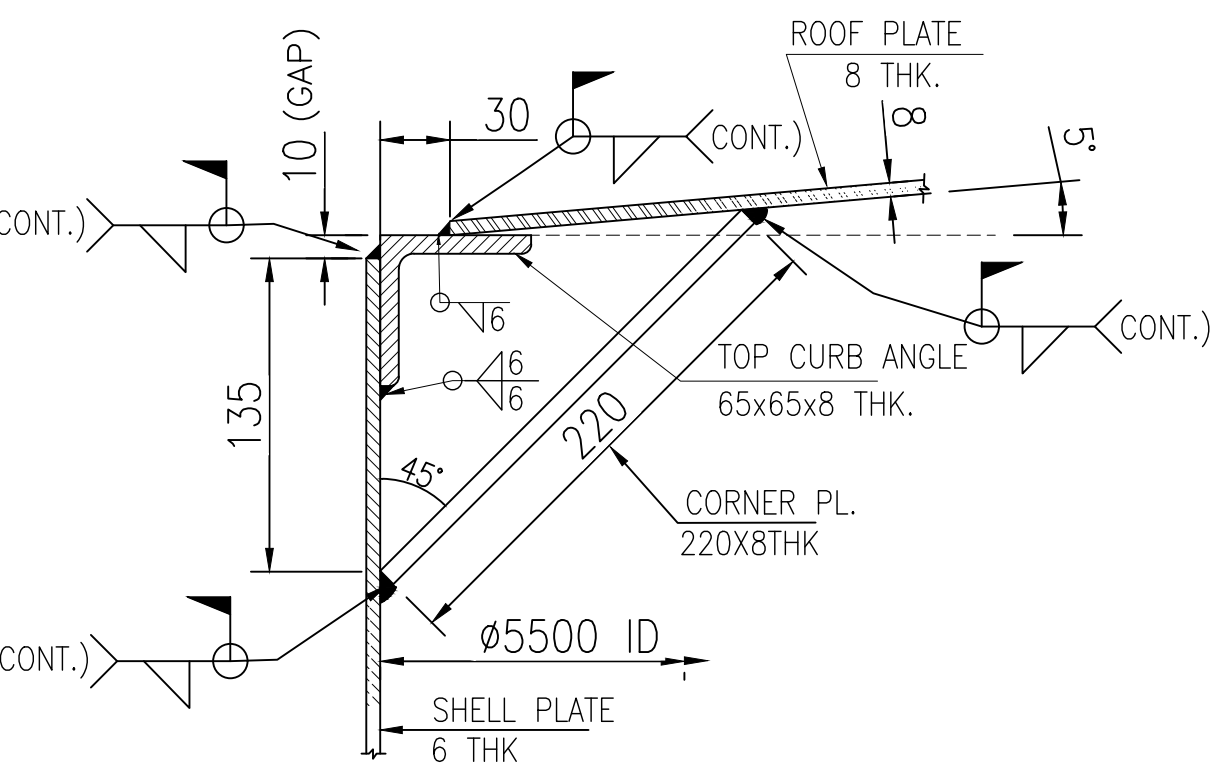
6	ALL SHELL PLATES, CURB ANGLE & REINFORCEMENT PLATES SHALL BE BENT TO TANK OUTER RADIUS.
REFERENCE DRAWINGS	
S.NO	DRAWING/DOCUMENT
1	PROCESS P&ID WASTE WATER STORAGE TANK
2	GA DRAWING OF WASTE WATER STORAGE TANK
3	FOUNDATION INPUT DETAIL DRAWING OF WASTE WATER STORAGE TANK

FOR TENDER PURPOSE ONLY

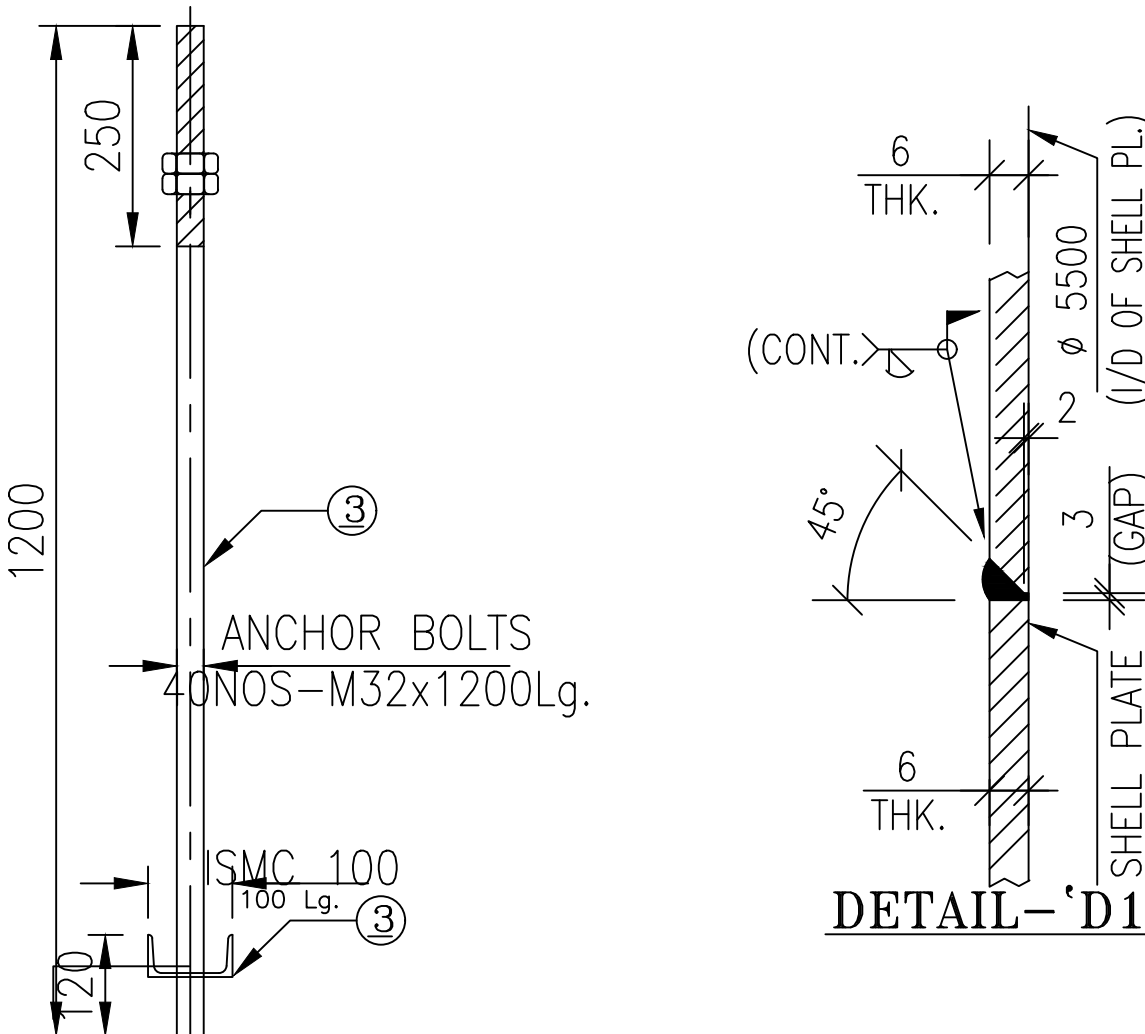
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DETAIL-'B'



DETAIL-'A'

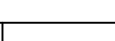


DETAIL-'D1

[illegible]

FOR TENDER PURPOSE ONLY

PROJECT:	KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT, (FGD PACKAGE)
CUSTOMER:	 TELANGANA STATE POWER GENERATION CO.LTD.
PMC CONSULTANT	 DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI

	BHARAT HEAVY ELECTRICALS LTD.				NAME		SIGN.		DATE		NO. OF VAR.		
	HYDERABAD				DRN.		R.MURALIDHAR				07.10.21		
					CHD.		K.N.B.REDDY				07.10.21		-N.A.-
					APPD.		M.S.S. NAGESH				07.10.21		
DEPT. PE&SD CODE 450	UNTOL. DIMS. Ø/M/F			SCALE NTS	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG.			ITEM NO.		NO. OF ITEMS		
						-N.A.-			-N.A.-		-N.A.-		
TITLE SHELL PLATE CUTTING LAYOUT DRAWING OF WASTE WATER STORAGE TANK					CARD CODE	DRAWING NO.					REV.		
						PYDH1M102844101					00		
						SHT. No 1					NO. OF SHT. 1		

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REF. DRG. NO.	COMPUTER FILE NAME
	13810105833-S01-R00

[illegible]

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER H10Z30Z061	CS
1.0	

CS

NAME PLATE DETAILS ① R2 R4

WASTE WATER STORAGE TAN
Ø 5.50 Mx 6.20 M HEIGHT

[illegible]

TANK
BOTTOM SHELL

100

5

5

100

PLATE
100X100X8THK

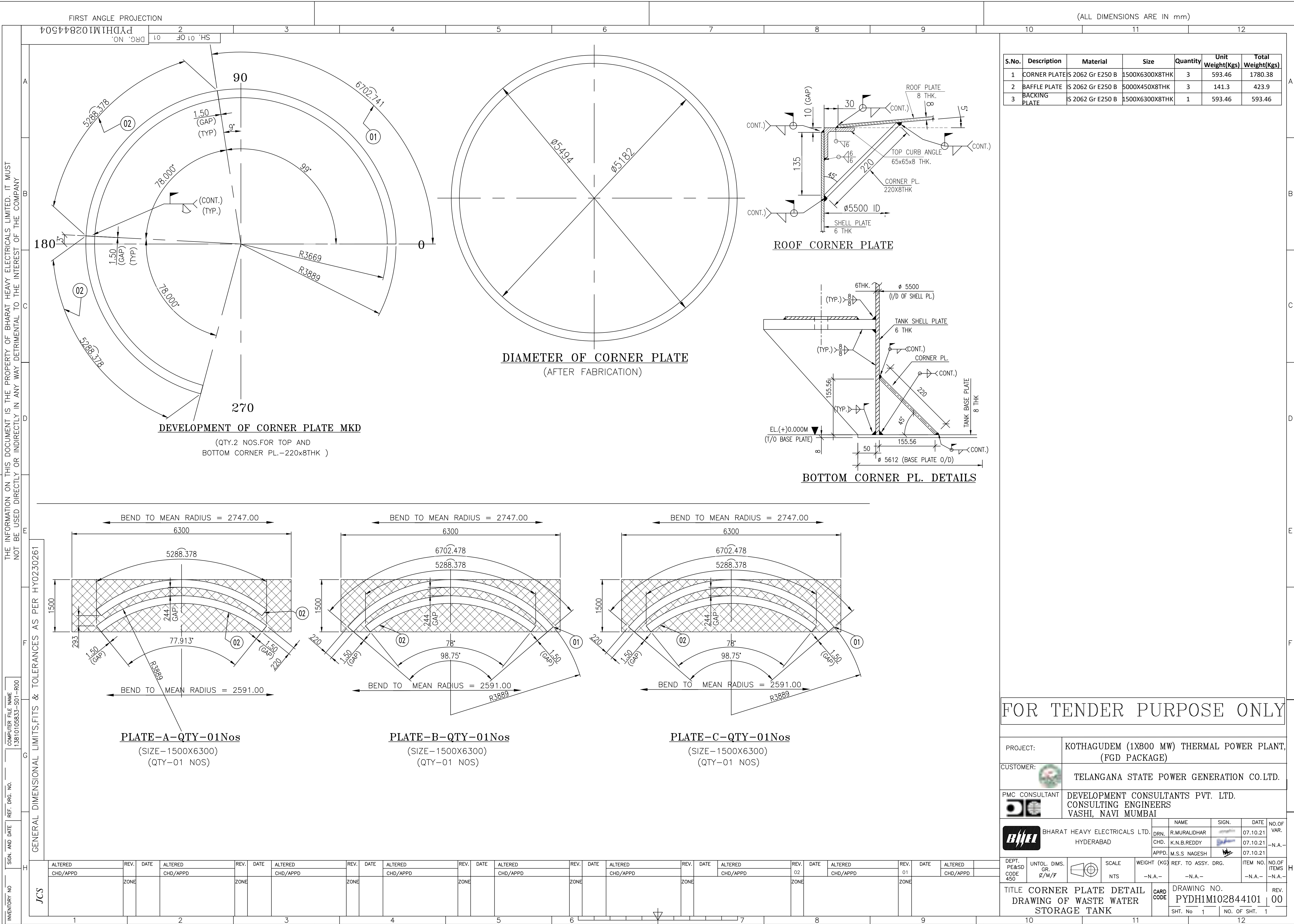
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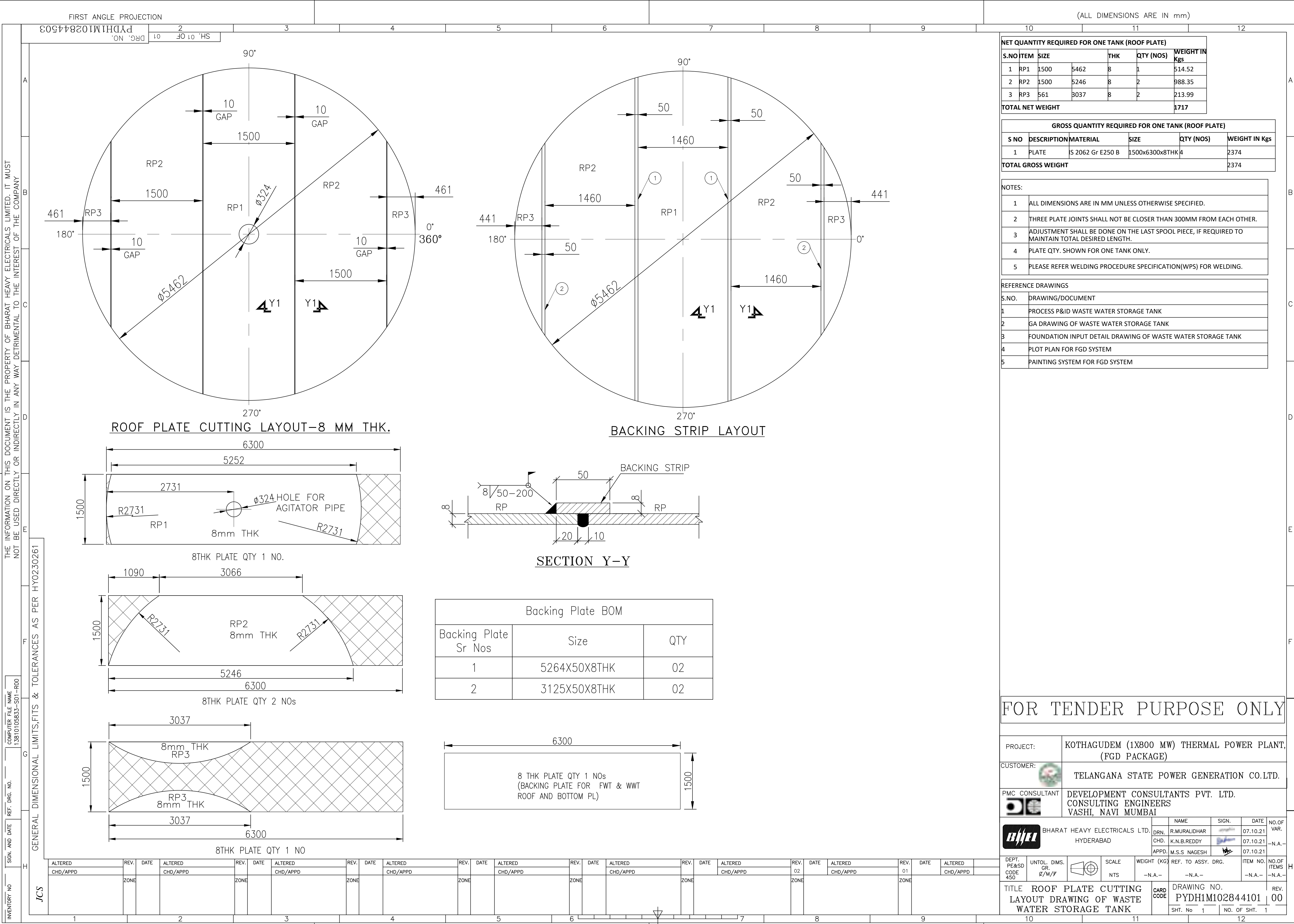
TANK I.D. $\phi 5500$

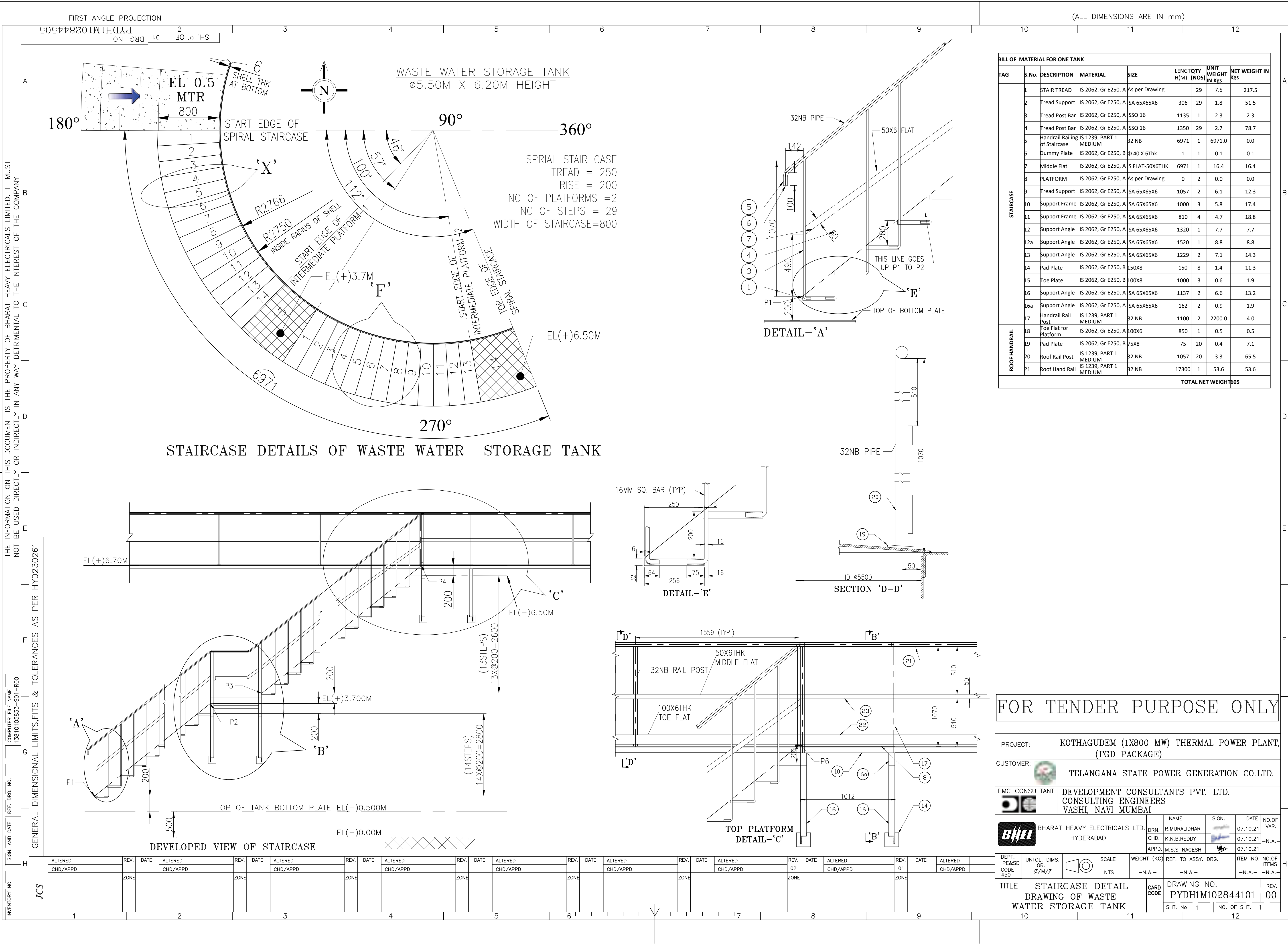
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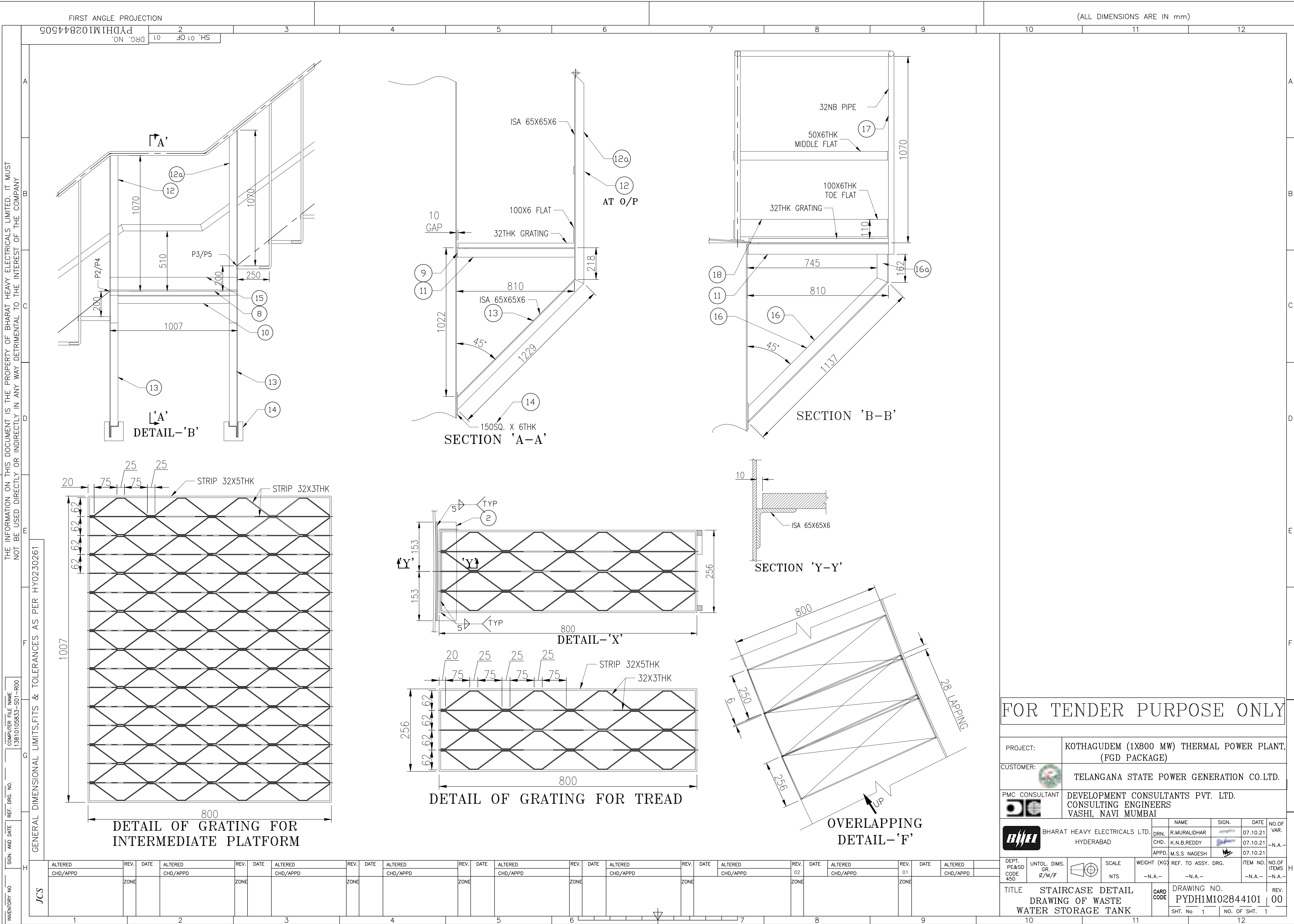
DETAIL OF ANCHOR BOLT:
QTY : 40Nos.

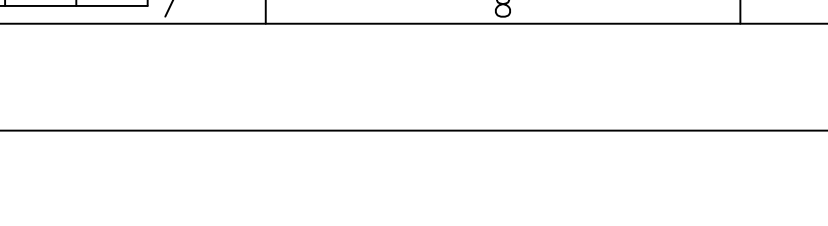
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CHD/APPD		CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD	
	ZONE		ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			NAME PLATE, ANCHOR CHAIR EARTHING LUG DETAILS ARE UPDATED.
1		2			3			4			5			6			7			8	







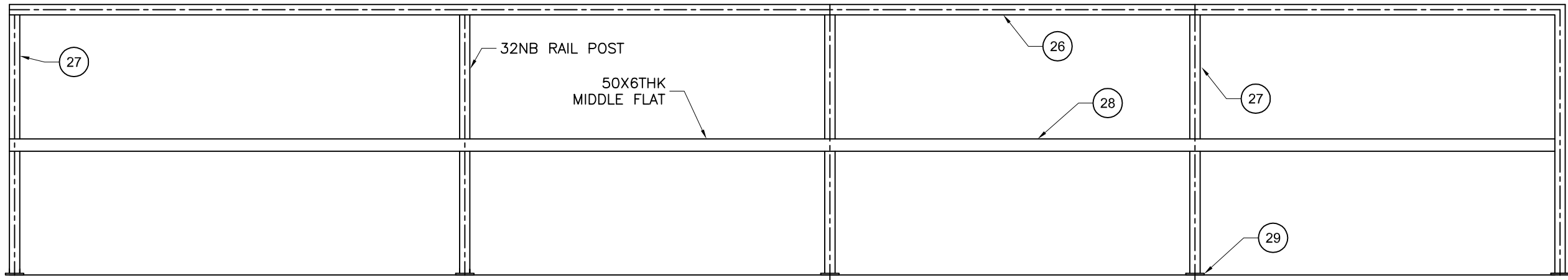




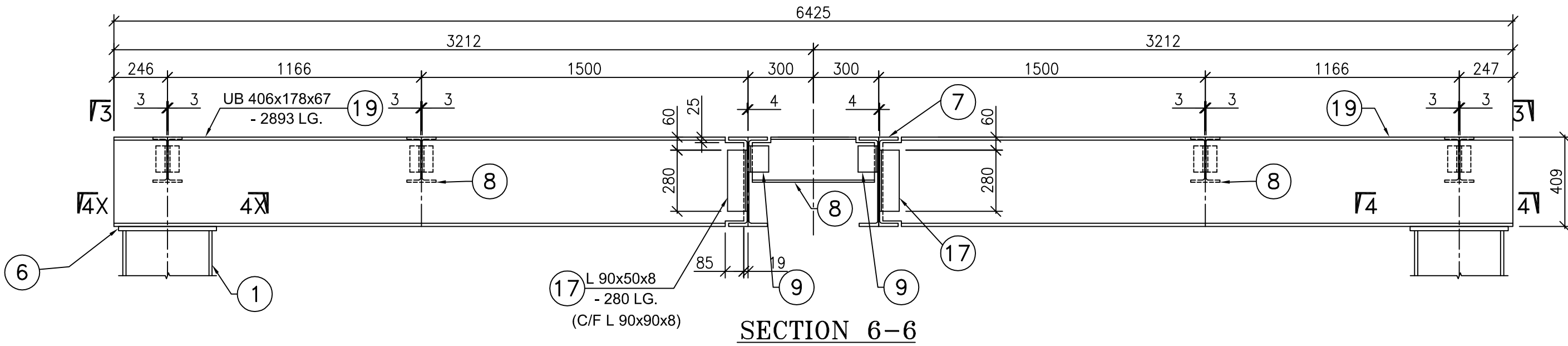
TITLENOZZLE DETAIL DRAWING WASTE WATER STORAGE TANK	CARD CODE	DRAWING NO.	REV.
		PYDH1M102844101	00
		SHT. No 1	NO. OF SHT. 1



WASTE WATER TANK

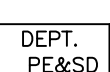
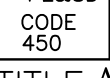


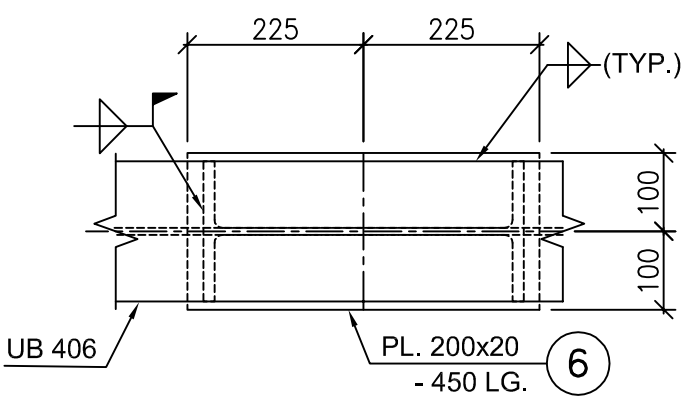
HANDRAIL DETAILS
(ON TOP OF OPERATING PLATFORM OF AGITATOR)



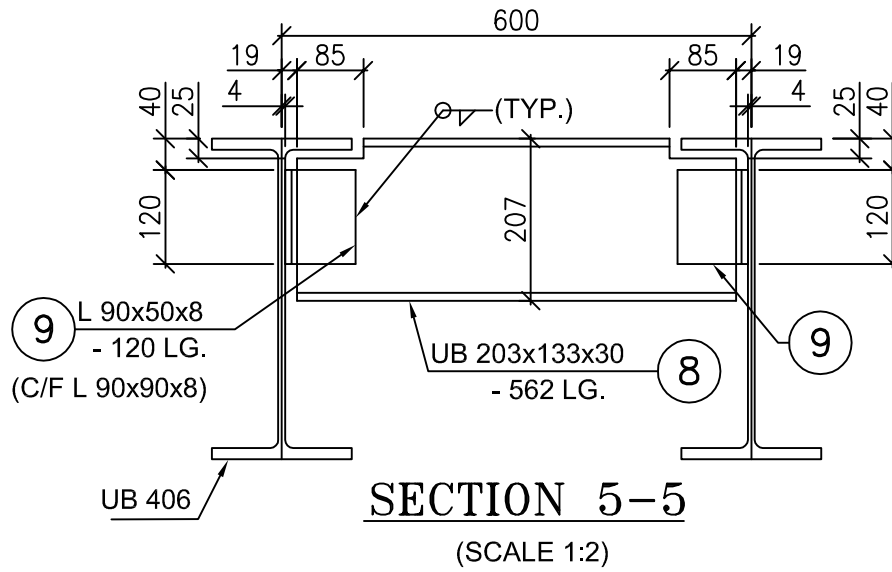
NOTES:—
1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN MM.

FOR TENDER PURPOSE ONLY

PROJECT:		KOTHAGUEDEM (1X800 MW) THERMAL POWER PLANT (FGD PACKAGE)					
CUSTOMER:		 TELANGANA STATE POWER GENERATION CO. LTD.					
PMC CONSULTANT		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS VASHI, NAVI MUMBAI					
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		DRN.	NAME	SIGN.	DATE	NO. OF VAR.	
 DEPT. PEASD CODE 150		CHD.	R.MURALIDHAR K.N.B.REDDY		07.10.21	—N.A.—	
		APPD.	M.S.S. NAGESH		07.10.21	—N.A.—	
 UNTOL. GR/M/F		 DIMS. 6	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	
 NTS		—N.A.—		—N.A.—		—N.A.—	
TITLE AGITATOR & ROOF STRUCTURE			CARD CODE	DRAWING NO.		REV.	
ARRANGEMENT OF WASTE WATER TANK				PYDH1M02844101		00	
				SHT. NO. 1		NO. OF SHT. 1	

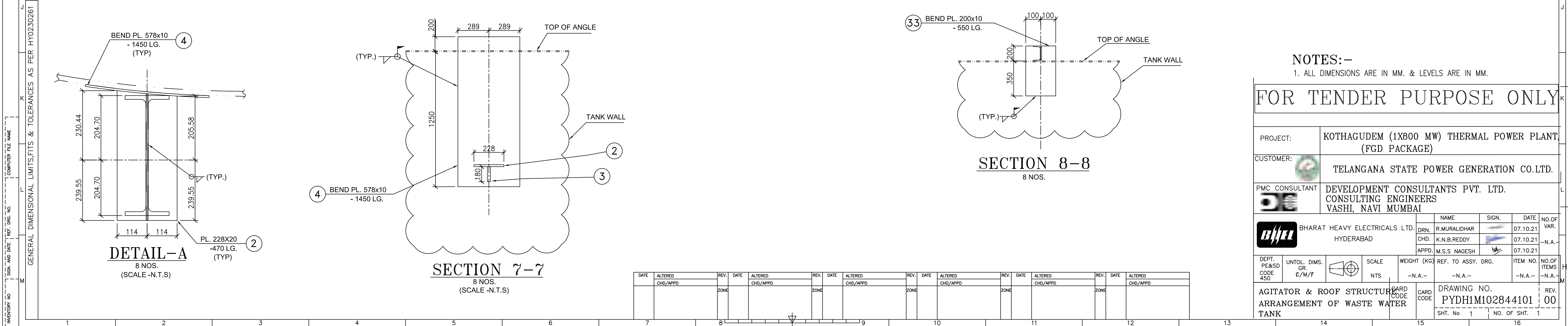
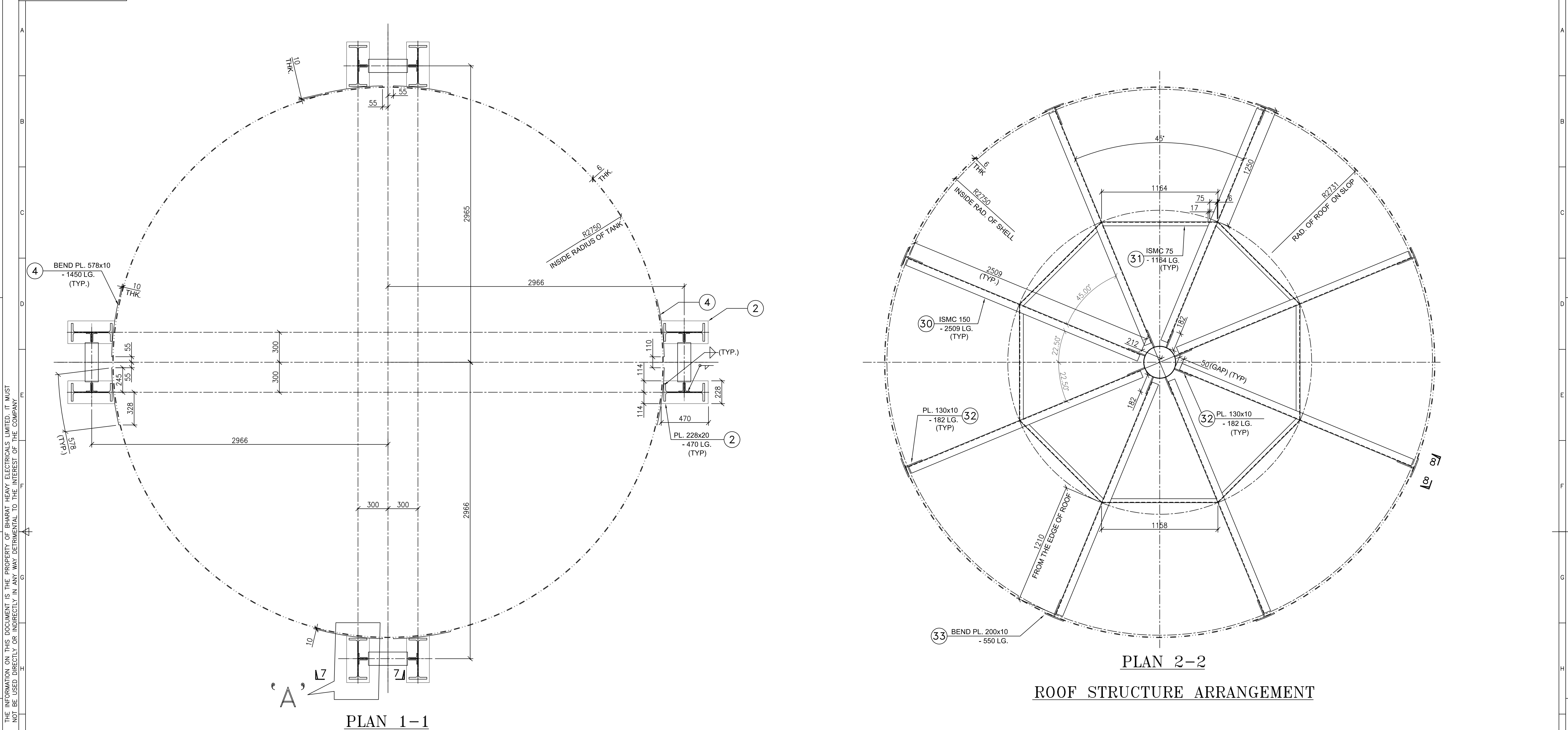


PLAN 4-4 (AS DRN.)
PLAN 4X-4X (OPP. HAND)
(SCALE 1:2)



SECTION 5-5
(SCALE 1:2)

[illegible]



04	10.11.2021	Revised the document as comments	KMK	PR	PNR
03	01.11.2021	Revised the document as MOM dtd:02.09.2021	KMK	PR	PNR
02	13.08.2021	Revised the document as per the comments	KMK	PR	PNR
01	14.05.2020	Modified as per Latest discussions with TS GENCO	KMK	PR	PNR
00	15.05.19	Fresh Issue	KMK	PR	VK
REV	DATE	DESCRIPTION /NOTE	PRD	CHD	APD

REVISIONS

TITLE:

P & ID_ABSORBER AND ABSORBER AREA SUMP

OWNER/PROJECT: **TELANGANA STATE POWER GENERATION CORPORATION LTD**



KOTHAGUDEM (1X800 MW) THERMAL POWER PLANT–
FGD SYSTEM PACKAGE

CONSULTANT:



DEVELOPMENT CONSULTANTS PRIVATE LIMITED
KOLKATA

EPC CONTRACTOR:



BHARAT HEAVY ELECTRICALS LTD.
BOILER AUXILIARIES PLANT, RANIPET

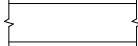
COLLABORATOR



MITSUBISHI HITACHI POWER SYSTEMS, LTD
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

	BHEL	Date	
PREPARED BY	Kabilash	10.11.2021	STATUS : <i>FOR APPROVAL</i>
CHECKED BY	Raju Puram	10.11.2021	BHEL CUST NO : G801
APPROVED BY	P Naveen R	10.11.2021	BHEL DOC NO : 03-FW-213-00580
			REV NO :04

LINE SYMBOLS

SYMBOLS	NAME
	PIPE LINE
	CAPILLARY TUBING
	ELECTRIC SIGNAL
	SOFTWARE LINK
	PRESSURE LEAD
	DUCT

PIPING VALVE SYMBOLS

SYMBOLS		NAME
	 NC	GATE VALVE (NOR.CLOSED)
	 NC	GLOBE VALVE (NOR.CLOSED)
	 NC	BALL VALVE (NOR.CLOSED)
	 NC	BUTTERFLY VALVE (NOR.CLOSED)
	 NC	DIAPHRAGM VALVE (NOR.CLOSED)
	 NC	PINCH VALVE (NOR.CLOSED)
	 NC	NEEDLE VALVE (NOR.CLOSED)
		CHECK VALVE
		CHECK VALVE (WAFER)
		PRESSURE RELIEF VALVE

INSTRUMENT VALVE SYMBOLS

SYMBOLS	NAME
	ACTUATED BY AIR
	ACTUATED BY MOTOR
	ACTUATED BY MOTOR (INCHING)
	AIR CONTROL VALVE
	SOLENOID ACTUATOR
	SELF REGULATING VALVE
	SELF REGULATING VALVE

TRENCH SYMBOLS

SYMBOLS	NAME
	TO ABSORBER AREA DRAIN SUMP
	TO GYPSUM AREA DRAIN SUMP
	TO LIMESTONE AREA DRAIN SUMP

SYMBOLS FOR PIPING PARTS & INSTRUMENT PARTS

SYMBOLS	NAME
	STEAM TRAP
	AIR TRAP
	Y-STRAINER
	T-STRAINER
	TEMPORARY STRAINER
	REDUCER
	EXPANSION JOINT
	DUCT EXPANSION JOINT
	FLEXIBLE HOSE
	SPOOL PIECE
	VENT
	HOSE CONNECTION
	BLIND FLANGE
	REDUCING FLANGE
	CAP (BW)
	CAP (SCR)
	TRENCH
	SIGHT GLASS
	SILENCER
	ORIFICE
	DIAPHRAGM
	MAGNETIC FLOW METER
	VORTEX FLOW METER
	PH METER
	FILTER
	MANHOLE
	INSPECTION HOLE
	PITOT TUBE
	SAMPLING POT
	SAMPLING NOZZLE
	RESTRICTION ORIFICE
	ROTOMETER TYPE FLOW METER

SYMBOLS FOR VALVE OPERATION

SYMBOLS	NAME
	FAILURE OPEN (THE VALVE OPENS WHEN AIR OR ELECTRICITY FOR ACTUATOR FAILS.)
	FAILURE CLOSE (THE VALVE CLOSES WHEN AIR OR ELECTRICITY FOR ACTUATOR FAILS.)

INSULATION SYMBOLS

SYMBOLS	DESCRIPTION
H10	THERMAL INSULATION (100°C & LOWER)
H15	THERMAL INSULATION (101°C ~ 150°C)
H20	THERMAL INSULATION (151°C ~ 200°C)
H25	THERMAL INSULATION (201°C ~ 250°C)
H30	THERMAL INSULATION (251°C ~ 300°C)
H35	THERMAL INSULATION (301°C ~ 350°C)
HF	INSULATION FOR ANTI FREEZING
ET	ELECTRIC TRACE
ST	STEAM TRACE (LOW PRESSURE STEAM)
P10	PERSONAL PROTECTION (100°C & LOWER)
P15	PERSONAL PROTECTION (101°C ~ 150°C)
P20	PERSONAL PROTECTION (151°C ~ 200°C)
P25	PERSONAL PROTECTION (201°C ~ 250°C)
P30	PERSONAL PROTECTION (251°C ~ 300°C)
P35	PERSONAL PROTECTION (350°C ~ 400°C)

DELIVERY LIMITS

SYMBOLS	NAME
	BETWEEN CLIENT AND CONTRACTOR
	BETWEEN SUB CONTRACTOR AND VENDOR

SYSTEM

NUMBER	NAME
1	FLUE GAS SYSTEM
2	SO ₂ ABSORPTION OXIDATION SYSTEM
3	REHEATING SYSTEM
4	GYPSUM DEWATERING HANDLING SYSTEM
5	LIMESTONE PREPARATION SYSTEM
6	BLANK
7	SUMP SYSTEM
8	UTILITY SYSTEM

FLUID NAME

FLUID SYMBOL	FLUID NAME	FLUID SYMBOL	FLUID NAME
AA	ANTIFOAM AGENT	WCS	COOLING WATER SUPPLY
AC	COMPRESSED AIR	WCR	COOLING WATER RETURN
AF	FLUIDIZER AIR	WC	Ca(OH) ₂
AI	INSTRUMENT AIR	WP	PROCESS WATER
AO	OXIDATION AIR	WR	RAW WATER
AS	SEAL AIR	WW	WASTE WATER
DD	DUCT DRAIN	VG	VACUUM PUMP VENT
FS	FILTRATE SLURRY	VBG	BELT FILTER VENT GAS
GS	GYPSUM SLURRY	LD	LIMESTONE DEDUSTING
LS	LIMESTONE SLURRY	LOL	LUBE OIL (LOW PRESSURE)
FG	FLUE GAS	LOH	LUBE OIL (HIGH PRESSURE)

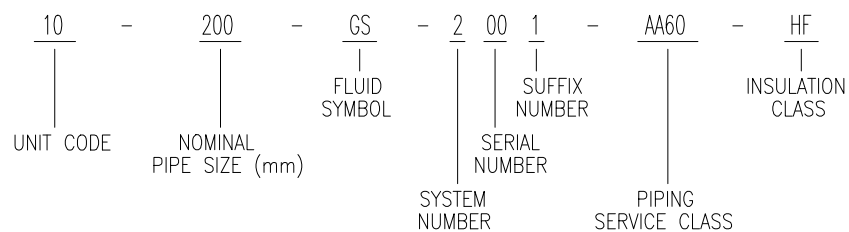
SERVICE CLASS

SERVICE CLASS	MATERIAL	FLUID SYMBOL
AA40	IIR RUBBER LINED PIPING	LS, WP, WC
AA60	IIR RUBBER LINED PIPING	GS,FS,WW,DD
BA01	Gr.304 STAINLESS STEEL / GI PIPING	AI, LOL
BA02	Gr.304 STAINLESS STEEL / GI PIPING	LOH
BA03	Gr.316L STAINLESS STEEL PIPING	WP, AO
CA01	CARBON STEEL GENERAL PIPING	AS,AO,AC,AF,LD
CC01	CARBON STEEL PRESSURE PIPING	WP,WR,WCS,WCR, VG, AA
DA60	FRP PIPING (PIPE DIA UPTO 400 NB)	GS,FS,WW,DD
DA40	FRP PIPING (PIPE DIA UPTO 400 NB)	LS, WP, WC

UNIT CODE

SYMBOLS	UNIT IDENTIFICATION
00	COMMON
10	UNIT-1 FGD SYSTEM AND AUXILIARIES

EXPRESSION OF PIPING LINE



CUSTOMER NOS:G801

CUSTOMER: TSGENCO.
PROJECT: KTPS 1X800 MW FGD SYSTEM PACKAGE

 BHARAT HEAVY ELECTRICALS LIMITED, UNIT: BOILER AUXILIARIES PLANT, RANIPET-632 406.	DEPT		NAME (BHEL)	DATE
	CODE	DRN	KM.KABILASH	04.03.21
	M	CHD	P.RAJU	04.03.21
		APPD	PNR/ACR/RSB	04.03.21



MITSUBISHI HITACHI POWER SYSTEMS, LTD.
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - SYMBOL MARK (1/2)

SCALE : NTS

TITLE:	F & ID - SYMBOL
FILE NO	03-FW-000-00605

REV NO	00
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INSTRUMENT ABBREVIATION

	FIRST-LETTER		SUCCEEDING-LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		BLANK	BLANK	BLANK
C	BLANK			CONTROL	
D	BLANK	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	BLANK		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	BLANK	MOMENTARY			MIDDLE, INTERMEDIATE
N	BLANK		BLANK	BLANK	BLANK
O	BLANK		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT(TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

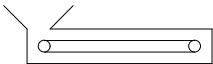
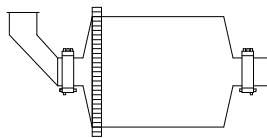
INSTRUMENT SYMBOLS

SYMBOLS	NAME
	FIELD MOUNTED
	FOR CONTROL ROOM
	FOR LOCAL CONTROL PANEL
	FOR DCS
	INTERLOCK LOGIC

PNEUMATIC VALVE ACTUATOR

CODE NO.	ACTUATION
FLXXWA-D	DOUBLE SOLENOID NO LIMIT SWITCH
FLXXWA-DL	DOUBLE SOLENOID WITH LIMIT SWITCH
FLXXWA-S	SINGLE SOLENOID NO LIMIT SWITCH
FLXXWA-SL	SINGLE SOLENOID WITH LIMIT SWITCH

MACHINARY SYMBOLS

SYMBOLS	NAME
	PUMP
	FAN / BLOWER
	AGITATOR (FLAT BLADE)
	AGITATOR (PROPELLOR)
	ROTARY VALVE
	CRUSHER
	BELT FEEDER
	BELT FILTER
	BALL MILL
	CYCLONE
	MIST ELIMINATOR

EQUIPMENT SYMBOLS

SYMBOLS	NAME
	BAG FILTER
	SILO
	SLIDE GATE
	TANDEM LOUVER DAMPER (MULTIVANE)
	SINGLE STAGE LOUVER DAMPER (MULTIVANE)
	LOUVER DAMPER (SINGLE VANE)
	DISTRIBUTION BOX (3WAY)
	DISTRIBUTION BOX (2WAY)
	SUMP
	HEAT EXCHANGER
	SHELL AND TUBE HEAT EXCHANGER
	AIR DRYER
	FILTER
	SPRAY NOZZLE

DRIVER SYMBOLS

SYMBOLS	NAME
	AIR MOTOR
	ELECTRIC MOTOR

OTHER SYMBOLS

SYMBOLS	NAME
	INSERT PIPE / LANCE
	CHUTE
	TRUCK

CUSTOMER NOS:G801

CUSTOMER: TSGENCO.
PROJECT: KTPS 1X800 MW FGD SYSTEM PACKAGE

 SHARAT HEAVY ELECTRICALS LIMITED, UNIT: BOILER AUXILIARIES PLANT, RANIPET-632 406.	DEPT		NAME (BHEL)	DATE
	CODE	DRN	KM.KABILASH	04.03.21
	M	CHD	P.RAJU	04.03.21
		APPD	PNR/ACR/RSB	04.03.21

 MITSUBISHI HITACHI POWER SYSTEMS, LTD.
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

P & ID - SYMBOL MARK (2/2)



FILE NO 03-FW-000-00605

REV NO	00
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Write Up on Absorber

Purpose:

This write up describes the equipment associated with absorber system and defines the associated control system.

Equipment List:

S. No.	Description	Item No.	Qty
1	Absorber	10 HTD 00 BB 001	1
2	Jet Air Sparger	10 HTG 01/14 BN 001	14
3	Absorber agitator	10 HTD 00 AM 001/002	2
4	Absorber mist eliminator	10 HTE 00 AT 001	1
5	Absorber recirculation pump	10 HTD 00 AP 001/005	5 Nos (4W+1S)
6	Gypsum Bleed Pump	10 HTM 00 AP 001/002	2 Nos (1W+1S)
7	Oxidation blower	10 HTG 00 AN 001/002	2 Nos (1W+1S)

Operation Write Up:

Flue gas from Booster Fans enters into GGH and then to Absorber. Absorber has a single recirculation stage which quenches the flue gas and removes SO₂ simultaneously.

Absorber is Double-Contact-Flow Scrubber (DCFS) consisting of a single-counter current tower with integrated absorber oxidation tank at the bottom. The flue gas flows upward from the bottom contacting with the sprayed slurry sent from the Slurry Recirculation Pumps.

In order to avoid deposit formation at the flue gas sprayed slurry interface area, the inside wall at absorber inlet part is washed intermittently with water pumped from the process water tank. The absorbed SO₂ is partially oxidized in the tower by oxygen in the flue gas. Oxidation of the remained unoxidized SO₂ is performed in tank by oxidation system which is called as Jet Air Sparger (JAS). A part of the discharged fluid of the recirculation pump is distributed to several numbers of JAS nozzles and flown into the reaction tank of the absorber through the nozzles.

There is an orifice plate where negative pressure is generated at downstream of the plate inside the JAS nozzle. The oxidation air is induced by oxidation air blower into the air induction nozzle. By mixing air and slurry in JAS nozzle under the turbulent flow condition, fine air bubbles are generated and effectively dispersed into the tank to produce efficient gas-slurry contact and

agitation condition. Therefore, oxidation reaction is carried out efficiently in tank. Further, jet stream from the nozzles widespread at tank bottom realizes mixing of slurry in the absorber tank. This phenomenon prevents sedimentation of solids at the absorber bottom without agitator operation while oxidation reactions promote to generate high-grade gypsum as a by-product.

The following liquids are added to the absorber:

- Process water.
- Limestone slurry from the limestone slurry storage tank.
- Filtrate from the filtrate water tank.

Absorber slurry concentration is measured continuously by density meter and kept at approx. 30 wt% by bleeding slurry to gypsum dewatering system. Entrainment from the absorber is removed with horizontally installed absorber mist eliminator located at the downstream of the absorber. Two -stage chevron type elements are installed horizontally to collect entrainment with high efficiency.

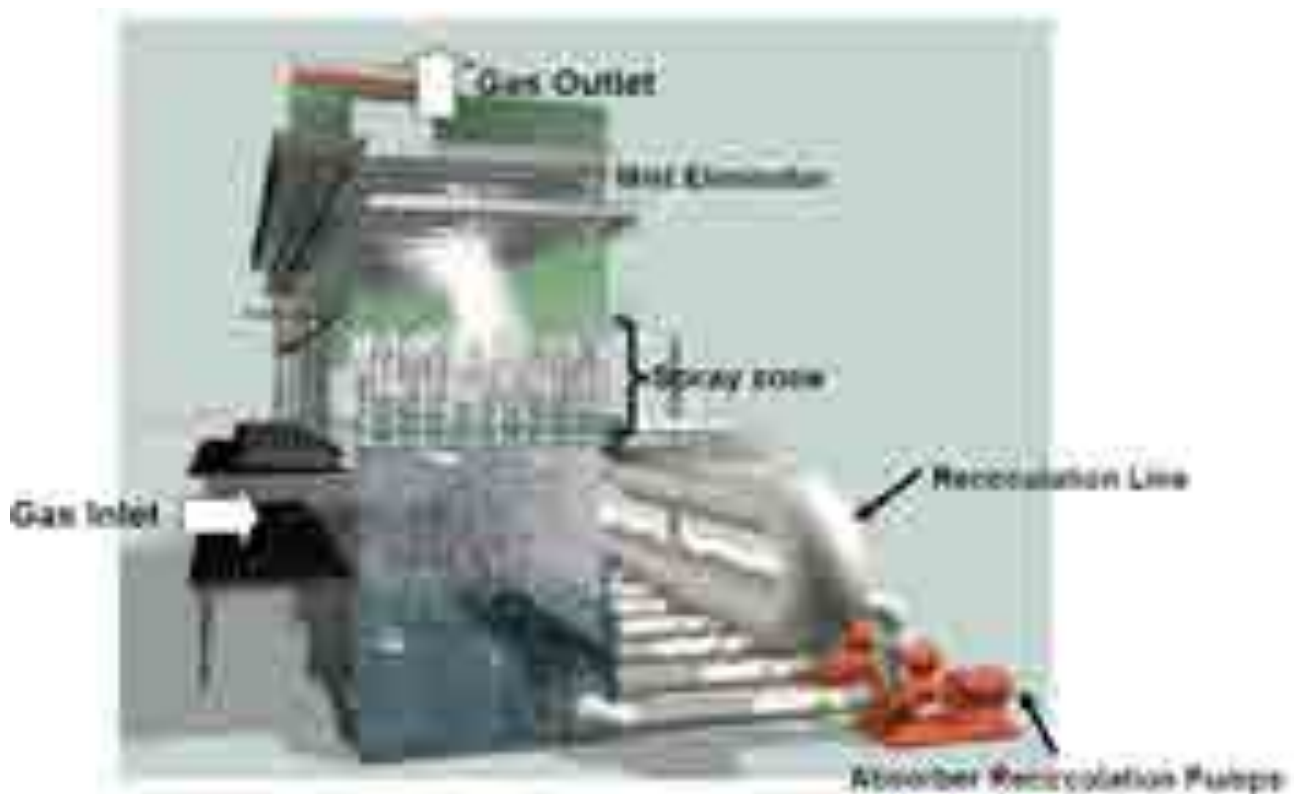
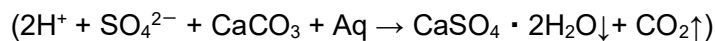
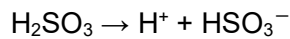
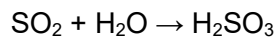


Fig-1-Typical DCFS Absorber

Entrainment is dropped to the absorber tank. Washing spray header system is furnished in front of each eliminator element and at back of first and second eliminator element to remove element surface deposits with intermittent washing. Washing spray header system at back of Second mist eliminator element is used when pressure loss in mist eliminator increases.

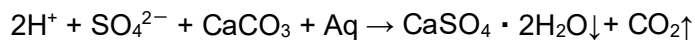
The process chemistries in absorber are as follows:

Absorber



SO₂ gets absorbed into H₂O, then dissociates from H₂SO₃ to H⁺ and HSO₃⁻. A portion of HSO₃⁻ is oxidized by O₂ contained in the flue gas and gets converted into H₂SO₄. CaCO₃ in slurry neutralizes a portion of H₂SO₄ and thus recovers pH of slurry.

Absorber Tank



All remained HSO₃⁻ in slurry is oxidized by oxidation air to be converted into H₂SO₄. Thereafter it gets neutralized with CaCO₃ to produce CaSO₄ · 2H₂O.

Absorber emptying mechanism in case of emergency:

For Absorber tank emptying, both the Bleed pumps are operated to fill the auxiliary absorbent tank, till the absorber tank level reaches to LL3 level. Once the absorber tank level reach to LL3 level, bleed pumps will be switched off. Subsequently, absorber tank drain valves opened to drain the remaining slurry from absorber to absorber area drain sump. And gypsum slurry from absorber area drain sump is pumped to auxiliary absorbent tank.

Control Write Up:

1. Process Control Method

The control system is designed to provide safe and reliable operation of the FGD plant.

The FGD plant is designed not to interfere on the boiler operation and to maintain the specified desulfurization performance, in spite of the boiler load-change by controlling the absorbent feed rate to the absorber.

1.1 Follow up Control to Boiler Load

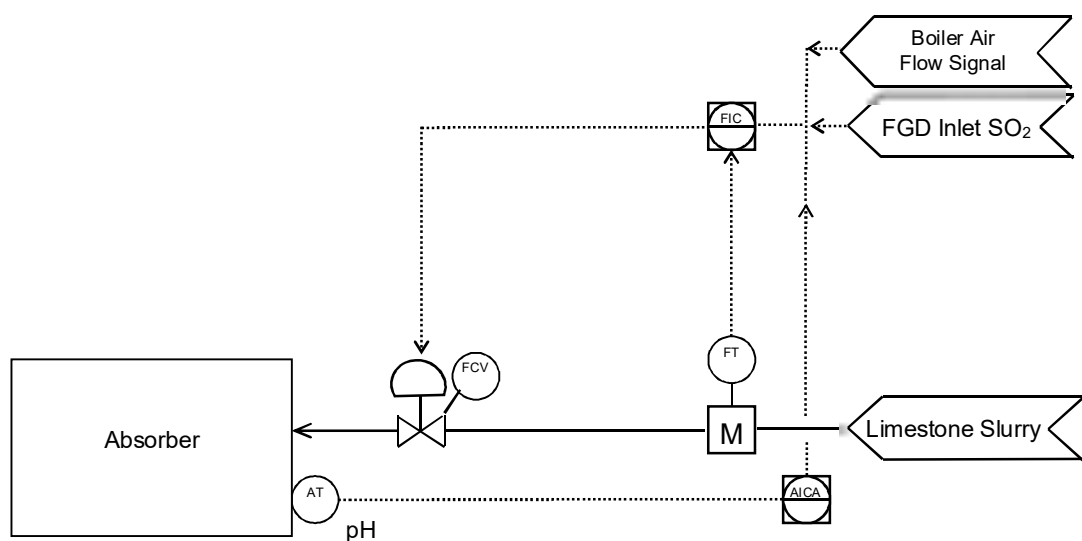
Since the operation of FGD plant has to correspond with the boiler load variation, it has to estimate the flue gas flow rate at FGD plant inlet. Then the flue gas flow rate is calculated by the function transformation of boiler air flow signal as a feed forward signal.

1.2 Absorbent Feed Control

Limestone slurry flow rate to absorber is controlled to keep the stable desulfurization efficiency.

The limestone slurry flow rate is estimated corresponding to the boiler air flow and FGD plant inlet SO_2 concentration as a feed-forward signal, and then is adjusted by the absorber tank pH as a feed-back signal.

Absorbent Feed Control



1.3 Slurry Concentration Control (Absorber Density Control)

Gypsum slurry in the absorber tank is controlled to keep the fixed range concentration.

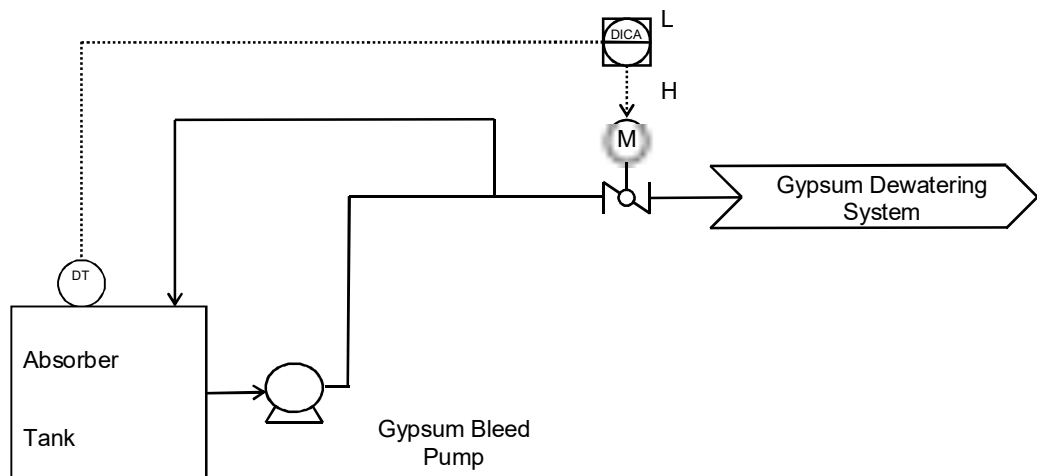
Gypsum slurry concentration is kept fixed range by observing the slurry density with density meter and operating gypsum dewatering system by batch operation.

Gypsum Bleed is controlled based on the gypsum density. Gypsum bleed valve (is operated based on the input from density meter.

Once the gypsum density reaches CH level i.e 32 Wt. %, Gypsum bleed valve gets opened and gypsum slurry will be sent to Primary hydro cyclone.

Gypsum bleed valve will be kept open till the gypsum density reaches to 28 wt.%. Same is shown in set points of absorber density.

Slurry Concentration Control

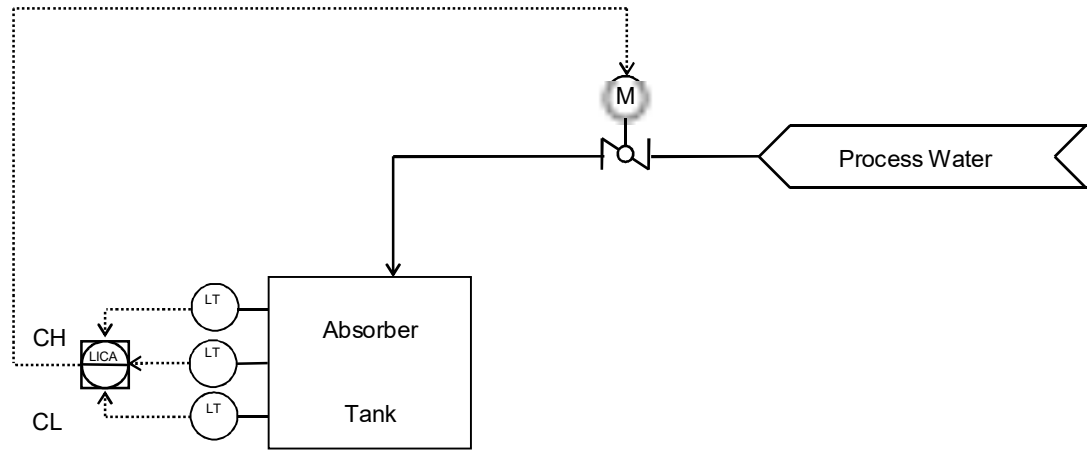


1.4 Absorber Tank Level Control

Absorber tank level is controlled to keep the fixed range level.

The absorber tank level is controlled by the quantity of make-up water supply to absorber tank by the batch operation.

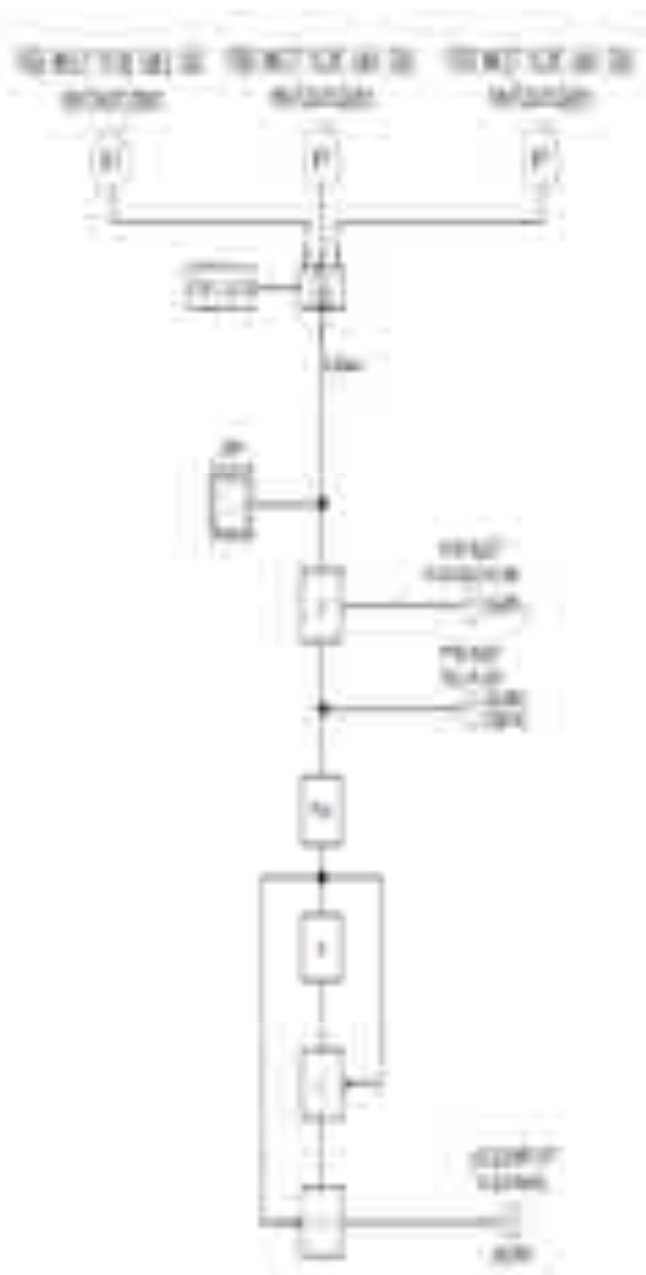
Absorber Tank Level Control



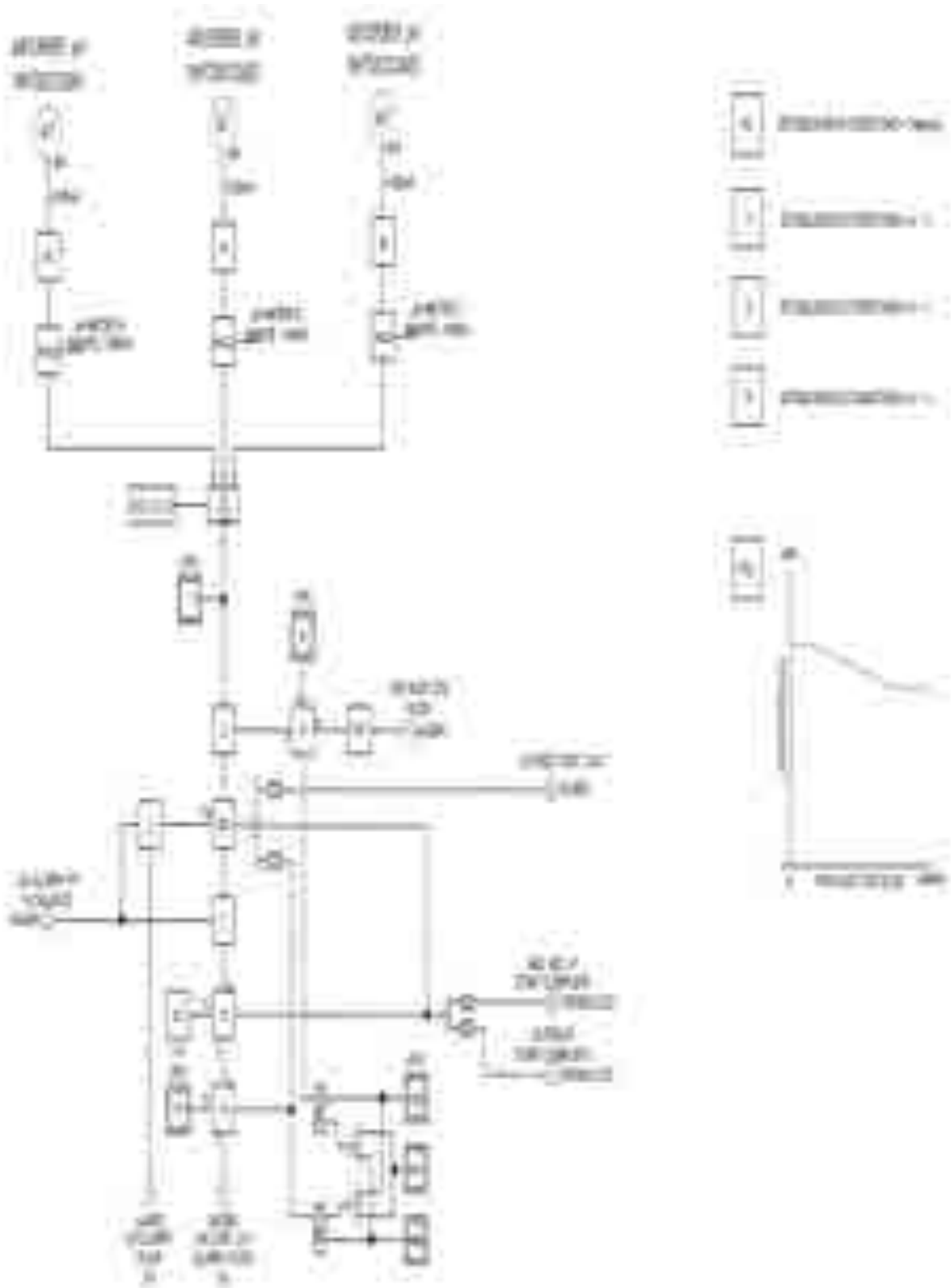
2.0. Limestone feed Control write up:

The FGD Inlet SO₂ & Boiler air flow signal function is taken as a feed forward to Ph. These are then compared and input is provided for flow control of limestone slurry. The pictorial representations are given below

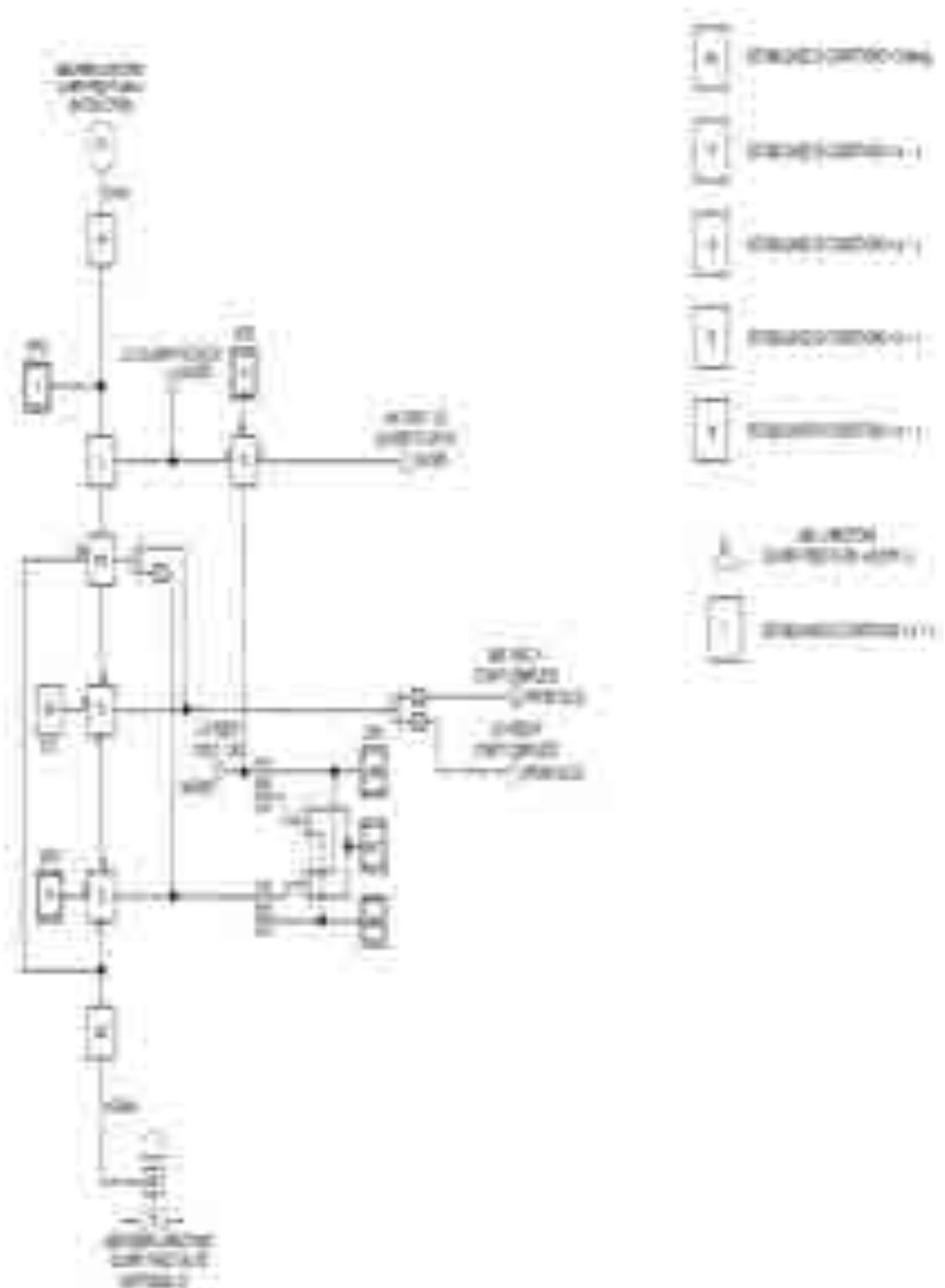
2.1. Limestone feed control logic based on Inlet SO₂ concentration:



2.2. Limestone feed control logic based on absorber pH value

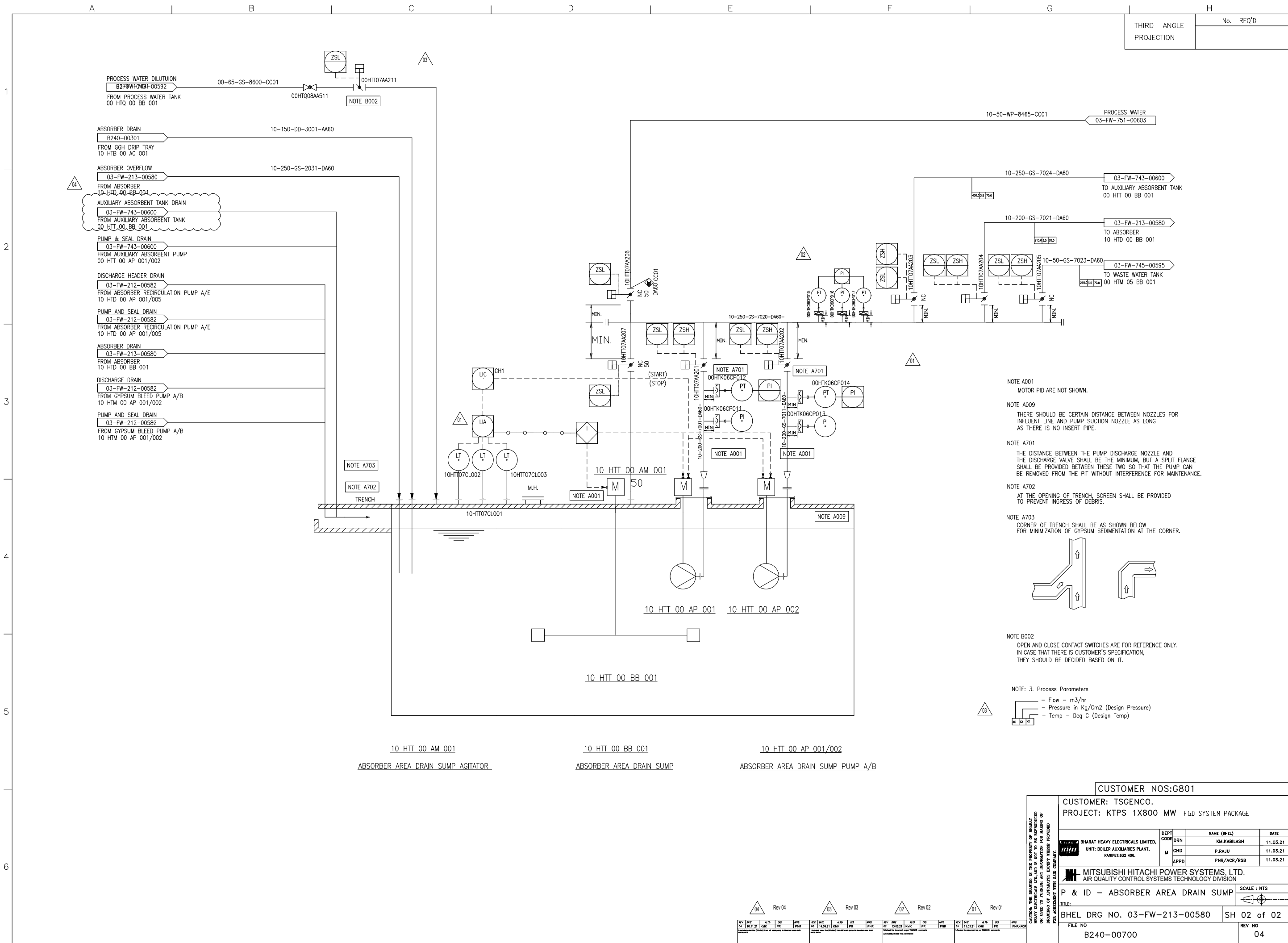


2.3. Limestone slurry feed valve operation control logic



Instruments List

Sl.No	KKS Code	Description of instrument	Quantity
01	10HTD02CF004/005	Magnetic Flow transmitter	02 Nos + 1 Loose
02	10HTD02CF001 & 10HTD02CF003	Rotameter flow transmitter	02 Nos
03	10HTD02AA401/403	Level transmitter	03 Nos
04	10HTD02CP501	Pressure Indicator	01 No



Write Up on absorber area drain sump & Pumps

Purpose: This write up describes the equipment associated with absorber area sump system and defines the associated control system.

Equipment List:

S. No.	Description	Item No.	Qty
1	Absorber Area Drain Sump Agitator	10 HTT 00 AM 001	1 Nos
2	Absorber Area Drain Sump Pump	10 HTT 00 AP 001/002	2 Nos (1W+1S)
3	Absorber Area Drain Sump	10/50 HTT 00 BB 001	1 Nos

Operation Write Up:

Purpose of drain sump

- (a) In the normal operation, the drain sump receives the Pump mechanical seal quenching water.
- (b) During GGH washing, Drain water from GGH drip tray will be sent to absorber area drain sump and it will be pumped to waste water tank by absorber area drain sump pump.

Required interlocks will be provided between GGH washing system and absorber area drain sump pump to ensure the Absorber area sump pump to feed GGH wash water to waste water tank.

- (c) In the maintenance, the drain sump receives the drain of pumps, pipes and tanks temporarily. Then the received drain is transferred back to absorber.
- (d) During an outage when the absorber tank has to be drained, the slurry is transferred into the Auxiliary Absorbent tank. Since the Auxiliary Absorbent tank is located above the ground, the remaining slurry of the absorber tank is drained by gravity into the Absorber Area Drain Sump. Slurry in Absorber area drain sump is sent back to the absorber tank by Absorber Area drain sump pump after the completion of inspection in the absorber.

Design Basis of Drain Sump

The size of the sump is 4.0mD x 4.0mW x 4.0mH as standard of MHPS based on the frequency of pump operation and the limitation of sump area space*. (*It is necessary for the space of Sump pump, Sump agitator and pipes to install on the sump area.)

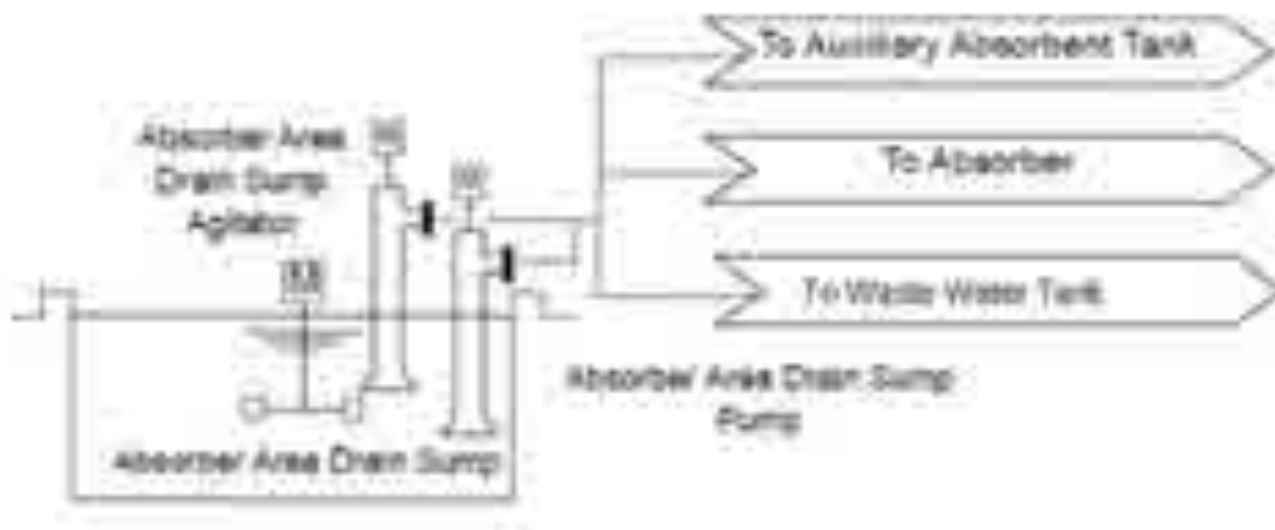
The sump operation levels are decided on reasons as follows;

HH level : Overflow level

H, L level: The level at which alarm operates.

CH, CL level: The level at which pump operates and stops.

LL level : The level at which pump stops for pump protection.



Absorber area sump along with agitator and Pumps

Instruments List (Sheets 6 to 10)

Sl.No	KKS Code	Description of instrument	Quantity
01	10HTT07CL001/003	Level Transmitter	03 Nos
02	10HTK06CP011 & 10HTK06CP013	Pressure Indicator	02 Nos
03	10HTK06CP012 & 10HTK06CP014 /017	Level transmitter	05 Nos

Table 3.3 Set Point List

Pressure

No.	Tag no.	Service	Range	Unit	Set Point	Value	Action	Basis	Remark
1	PIA	BUF Inlet Pressure		kPa	HH	6.3	INT : FGD Bypass Demper Open HH ANN	Mechanical design pressure of FGD inlet duct: +6.47 kpa	
					H	1.5	H ANN		
					N	0.30		To be finalized during commissioning	
					L	-1.0	L ANN		
					LL	-1.3	INT : FGD Bypass Demper Open LL ANN	Mechanical design pressure of FGD inlet duct: - 1.47 kpa	
					ΔH	Later	H ANN	PT measuring range x 0.05 (5%)	
2	PIA	Absorber Inlet Pressure		kPa	H	3.5	H ANN	Normal pressure + 1.0 kPa	
					N	2.5			
					L	1.5	L ANN	Normal pressure - 1.0 kPa	
					LL	1	L ANN	During Single Fan Operation	
3	PDIA	Mist Eliminator Differential Pressure		kPa	H	(*1)	H ANN	(Design pressure of ME +0.10kPa(Dirty)) x 1.1 ²	
4	PDIA	GGH Untreated Side Differential Pressure		kPa	H	(*1)	H ANN	Design Pressure (dirty condition)	
5	PIA	Instrumentation Air Pressure		MPa	H	0.8	H ANN	Design Pressure	
					L	(*1)	L ANN	Minimum pressure of solenoid valve +0.5 MPa	

※1 : Will be provided later based on the vendor information.

Table 3.3 Set Point List

Temperature

No.	Tag no.	Service	Range	Unit	Set Point	Value	Action	Basis	Remark
1	TIA	FGD Inlet Temperature		deg.C	HH	300	Interlock	Maximum temperature in AH mechanical trip condition	Emergency Spray valve open
					H	290	H ANN	Maximum temperature in AH mechanical trip condition – 10 deg.C	
					ΔH	(*1)	H ANN	TE measuring range × 0.05 (5%)	prevention for meter deflection
2	TIA	FGD Outlet Temperature		deg.C	HH	70	Interlock	Heat-resistant value of Absorber internal material	Emergency Spray valve open
					H	65	H ANN	Heat-resistant value of Absorber internal material – 5 deg.C	
					ΔH	(*1)	H ANN	TE measuring range × 0.05 (5%)	prevention for meter deflection

※1 : Will be provided later based on the vendor information.